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THEIR

NATURE AND TREATMENT.

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ON

SLIGHT AILMENTS:

THEIR

NATURE AND TREATMENT.

BY

LIONEL S. BEALE, M.B., F.R.S.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS; PROFESSOR OF THE PRINCIPLES AND PRACTICE OF MEDICINE IN KING'S COLLEGE, LONDON, AND PHYSICIAN TO KING'S COLLEGE HOSPITAL; LATELY PROFESSOR OF PATHOLOGICAL ANATOMY, AND FORMERLY PROFESSOR OF PHYSIOLOGY AND OF GENERAL AND MORBID ANATOMY IN KING'S COLLEGE.

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PREFACE.

THE few lectures forming this volume were delivered in the early part of my course on Medicine in the autumn of the year 1878.

The shorthand notes, taken by Mr. S. Knox, have been rearranged and carefully revised, and much new matter has since been added. Though preserving the somewhat familiar style permissible in elementary lectures to students, I have thought it better to give up the division into distinct lectures, hoping that in this less pretentious and more compact form, the work would be found more useful to young practitioners and their pupils.

L. S. B.

61 GROSVENOR STREET,

June 20th, 1880.

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SLIGHT AILMENTS,

THEIR

NATURE AND TREATMENT.

EACH one of us has, no doubt, suffered from time to time from slight derangements of the health—derangements not dependent upon or likely to determine structural change in any tissue or organ in the body—but due to temporary disturbance—to an alteration in the functional activity of tissues and organs, which may be soon succeeded by a return to the healthy state. In many instances probably the derangement depends only upon the altered rate at which normal phenomena are performed. Perhaps, in consequence of changes in the blood itself or in the tissues outside, the blood flows too slowly or too quickly through the capillaries, occasioning disturbed action in the adjacent nerve-fibres, and in this way causing the pain or discomfort we experience.

Among civilized nations a perfectly healthy individual seems to be the exception rather than the rule. In the course of my life I have not met with more than two or three exceptionally fortunate persons, who could assure me they had never suffered from any derangement of the health.

Such instances are certainly most uncommon, for almost every person one sees has experienced very frequent departures of one kind or another from the healthy condition, and expects to experience such as long as he lives.

A little too much food, or food of a bad kind, or badly cooked, or food eaten at the wrong time, or too quickly—a glass of bad wine, bad milk, or bad water, to say nothing of a dry east wind, or a cold damp atmosphere, has occasioned such disturbance in the normal changes in the body, as to cause even the strongest and exceptionally healthy among us to feel for a time far from well. Every generation has thus suffered, and we have not yet discovered exactly how a healthy person should proceed, so as to keep every organ and tissue in his body in a perfectly healthy state under the necessarily varying conditions to which it is exposed, so that each may continue to act for the longest possible time, until all gradually fail together in old age, and at last action ceases in natural and inevitable death.

As it is our particular work in life to reduce disease and suffering to the utmost extent that is possible, it is our duty to carefully study and investigate, as far as we are able to do so, the nature of such slight aches, pains, discomforts, and derangements from which nearly all suffer, and which not a few people magnify; although on the other hand, some are inclined to underestimate their importance, or to ignore altogether aches, pains, and disturbances, the early recognition of which might be of great advantage, enabling us to interfere at the right time, and, it may be, prevent serious illness or even to save that particular life.

You will certainly be very frequently called upon to prescribe for slight ailments, and you will often be asked how this and that bodily derangement or discomfort may be avoided, upon what it depends, and whether it is not indicative of some change more serious than mere temporary

disturbance of ordinary action. You will be expected to fully explain how many a slight ache or pain is caused, and you will often be asked to lay down rules of health, by the practice of which it may be avoided in the future. Very disappointed will the sufferer feel if you make light of his suffering, and dismiss him with the suggestion that being only functional derangement it is of no consequence. A little study and intelligent observation among sick people will teach you not to be too offhand in giving advice, and will suffice to impress upon you the fact, that very grave symptoms and the most excruciating pain may result from temporary derangements of no real consequence, and that, on the other hand, the most terrible morbid changes in important organs may exist for years, and run their course without the patient being cognizant of any unusual symptoms, or conscious that anything in his organism had been going wrong.

It, therefore, follows, and this will be strongly impressed upon you when you come to work carefully at the important subject of diagnosis, the detection of disease, that many of the apparently slight disturbances or ailments may be due to some grave pathological change, which would be entirely passed over by one who had had little experience in medical observation, but would be full of significance to the well-informed practitioner, and that apparently serious illness may be due to temporary and functional derangement only. Do not, therefore, be too hasty in giving an opinion concerning the import of uncertain and indefinite symptoms. We should remember that the most perfect machines sometimes go wrong without a flaw being detected just before the occurrence, it may be, of a complete breakdown. The tissues and organs and the marvellously minute and delicate structures of a living organism may fail in a hundred ways without giving any notice to its owner, while the

most careful scrutiny and minute examination may fail to demonstrate any fault or flaw; nay, even after the body had ceased to work, after its death, the changes resulting in its destruction may elude the most careful scrutiny. We know that hydrocyanic acid, for example, by its action on the nervous system, will kill a living organism in a few seconds, but as to the exact changes which the acid works in the nerve structures and their living particles, we know nothing. The same is true of many other modes of death. The flaws existing in tissues in disease are not always to be demonstrated, though possibly many at least might be demonstrable, if we only knew exactly how to render them evident and distinct.

Of the patients who come under our care, many, no doubt, are the subjects of but slight ailments, with the general nature of which any well-educated and experienced practitioner would be well acquainted. If, however, you go into practice fresh from the pathological theatre, and at once undertake the treatment of sick people,—if you pass from the investigations of important structural changes to the practical consideration of functional disturbance, and especially if you look too exclusively from a purely scientific standpoint, you will meet with many things that will puzzle you. Patients will not be satisfied, and you will be disappointed and annoyed, or perhaps altogether out of heart, or thoroughly disgusted with practical professional work.

It has been said that the physician should be a consolation to the patient, but many a physician fresh from the study of severe forms of disease would afford poor comfort to a dyspeptic, or to a person suffering say, from functional nervous disturbance, and hardly knows what to say to a patient in whose body he can discover no actual disease of tissues or organs. The patient describes many unpleasant and even alarming sensations and symptoms, which to him

are of grave consequence, and all the comfort that he can get from his medical adviser is, that there is no organic disease, and that he may go away and bear his complaints as best he can.

Medical advisers of purely anatomical and pathological habits of mind are apt to offend unscientific patients, and, without deserving it, gain for themselves the unenviable reputation of being thoughtless and unkind—regardless of others' suffering, and, if not objectionable, very far from agreeable ministers of relief. People do strongly object to follow the advice of such advisers, however correct it may be, and perhaps the least unfriendly among the patients of such a doctor would in confidence, and in the most quiet manner, recommend him as soon as possible to change his vocation. You see then that you ought to learn how to investigate the nature of slight ailments and how to relieve them, and how to reduce the severity of the patient's sufferings, if the conditions which give rise to them are beyond our means of control. If the patient's malady is incurable and ever so intractable he will be much more grateful to you for your attention, and for doing what you can to relieve his pain, than he would be if you favored him with the most elaborate disquisition concerning his case, even if accompanied with the demonstration that it was profoundly interesting and an exceptionally perfect illustration of highly important pathological phenomena. You will generally find that if a man has pain in his stomach, especially if accompanied with severe and painful spasm, he will not be satisfied with the assurance that he will be better when the wind is dispersed; and however interested you may be in studying the natural history of disease, the patient will desire your assistance to disperse the wind that torments him, and will want remedies to relieve his sufferings as soon as possible; and I think you will agree in the

opinion that such a patient is not more unreasonable than most doctors themselves would be under similar circumstances. Now if you know your work you can be of use both in getting rid of the flatus and in relieving the pain. If from ignorance of the use of simple remedies you tell the patient that nothing can be done, the chances are that he goes to some intelligent person who gives him a dose of bicarbonate of potash or some sal volatile, and at once relieves him. He feels well in the course of a few hours, and loudly praises the adviser of the successful treatment, while, on the other hand, anything but praise would fall to your share. I fear that the patient would give you a very bad character, and he might possibly speak of you as a most ignorant person and incompetent practitioner. And yet you might be well informed as regards the management of serious cases, though, perhaps, not acquainted with the great value of such simple commonplace remedies as bicarbonate of potash and sal volatile, and some other simple things which are very efficacious in curing various unpleasant aches and pains.

But, further, the study of the slight ailments is of no small importance to us, for it is of the greatest consequence that we ourselves should be in good health. Attendants of the sick should themselves be well, and each one of us should recognize the importance of keeping himself in a healthy state, that he may be cheerful and hopeful in the presence of the sick. It will never do for the doctor, while listening to the sorrows of his patients, to be continually reminded of his own discomforts, and constantly thinking, if not actually saying, that he is far worse than his patient, and more worthy of attention, sympathy, and commiseration. The sufferer suffers less if he has healthy, cheerful people about him. Dwelling on the fact of pain, and talking about it, increase it. Many who suffer

from temporary derangement will be in a low, despondent state. Such a frame of mind is probably due more to deranged action of the stomach and liver than to any other circumstance. This you may easily set right if you know how. Though you may be equally or even more dyspeptic and may feel very wretched, you must be careful not to add to the general depression, but must rather encourage and cheer the patient, and speak hopefully. All this is not very easy to do if we are not well. A doctor who is suffering aches and twinges is to be pitied, for he must not allow himself to complain. He must not make wry faces while he is inquiring into his patient's case. An ailing or hypochondriacal doctor will be of little use, and will soon get into discredit with patients, and will be disappointed with himself; and it will probably happen that some, it may be, ill-informed but more worldly-minded medical authority in his neighborhood will get the patients who ought to be in his more deserving hands. This, I fear, is not unfrequently the secret of many a failure in practice.

Those of you who, like many excellent men who have preceded you, feel inclined to condemn the delicate attention, the excessive care, the extreme solicitude for minute perturbations of sensation or emotion of the invalid, characteristic of some very successful and favorite doctors, should pause, and try to look a little from the patient's point of view. Even a philosopher who feels ill, though he may be sure that there is not much the matter with him, may nevertheless desire some skilled and experienced medical adviser who will appreciate his aches and pains, who will consider his complaint, and will listen patiently to the story of his woes, and will take a cheerful view of his case, and express himself accordingly, instead of suggesting possibilities of pathological degeneration in the gloomiest phraseology. You may be able to relieve many a patient by suggesting

some very simple remedy. A dose of bicarbonate of potash or lime water after meals may be all that is required to restore him to health. Little may be needed, but still that little assistance is required.

Those who will not endeavor to help their patients who are suffering from slight ailments had better not attempt to practice medicine at all, because they will almost certainly fail, seeing that a large percentage of our patients, fortunately for themselves, do not suffer from grave pathological changes, but nevertheless require intelligent medical assistance. There is not one amongst us who gives his attention only to those patients who are suffering from very serious forms of disease. You must, therefore, understand the nature of slight derangements, and you must know how to relieve them. You must not treat the complaining patient with contempt, and tell him there is nothing of any consequence the matter, and he may go about his business. If we behave in this manner the public will lose confidence in us, and great numbers of people will seek and accept advice from mere pretenders, and from wiseacres who discover the most wonderful and exceptional phenomena in very ordinary cases, and, while thus studying to gain the ear of the patient, make the most of every opportunity of casting a slur on those who have honestly practiced and studied their profession. Knowing little or nothing of morbid changes, and of the sciences upon which the investigation and treatment of disease rest, many of these professing healers are, in a way, extremely clever, and not a few have the advantage of a marvellous development of that peculiar mental endowment called "tact"—a most desirable possession for every one who has to treat and take care of sick people, if, in addition, he is honest and good. I would have you take note, however, that this word "tact" has a very comprehensive and elastic meaning, and is in these days applied to

an honest desire on the part of any one to avoid wounding the feelings of a sensitive person, or needlessly vexing such a one when it is necessary to communicate unpleasant things, and to the successful exercise of the most glaring imposture and pitiless humbug. One now and then gets, in a sense, an instructive, though a very painful and profitless lesson, as to the means by which the confidence of people unlearned in medical and other matters may be gained by a practitioner who is sadly deficient in knowledge and in experience, and who is perfectly conscious of his defects, but knows well how to make up for them. A master of tact, and determined to avail himself of the advantage he thus possesses in the struggle for existence, he convinces, he persuades, he flourishes where many a good man would fail, and, perhaps, where many such have already failed. Nevertheless, do not let me lead you to conclude that tact is another name for humbug, any more than that kindness and politeness imply insincerity; but it is only too true that some makers of fortunes have been indebted for their success to cunning, cuteness, and tact, rather than to hard work, goodness, or intellectual power; and he who thinks very highly of tact, and acts upon his opinion, must be very careful lest he slide too far down the incline, which carries him from the display of tact to the habitual exercise of humbug, and to giving way to utter heartlessness and selfishness of the lowest order.

It has been my lot to study, on more than one occasion, the well-turned phrases and persuasive sentences by which popular prescribers of decillionths of grains, brimful of tact, managed to bring conviction to the minds of people of intelligence, and at the same time to impress them with their profound knowledge and intelligence, though all the time they were writing nonsense, and probably knew that they were doing so. But, as is well known, cleverly stated non-

sense often hits the mark, and will continue to do so for many a long year. Men, high among the most intelligent and most learned, nay, men who have been looked up to as men of the world, have often been humbugged in matters medical, and even profound lawyers have failed to distinguish medical nonsense from medical sense, and mere sham from real scientific knowledge. Those who are always gauging the value of evidence, and devoting themselves to the extraction of truth, seem specially susceptible to medical and scientific imposition. But there is hardly a department of human endeavor in these days in which you will not find audacious humbugs influencing opinion, and gaining for a time notoriety and renown at the hands of their dupes. I know persons who would be easily influenced by what the quack says, who would go away from the honest, well-informed medical practitioner, with the idea that he knew nothing whatever about his business, and was quite ignorant of the nature of the changes taking place in the organism, and of the method by which these changes might be modified when they were not properly performed. This is unfortunate, but there is no help for it. Every upright practitioner has been placed in this most unhappy position, more than once in his life. Should you find yourselves so situated, the best thing is to say very little, and be as patient as possible, leaving matters to be set right by time. But, while doing our utmost to preserve and extend the high repute always enjoyed by medical practitioners, we must be careful not to play into the hands of pretenders, and this we shall certainly do if we needlessly offend fanciful and crotchety patients. By so doing we practically dismiss them to be preyed upon by quacks.

Great principles as regards the treatment of disease may, without doubt, be learnt and taught, and the influence of important remedies illustrated in the case of slight ailments

as well as in grave disorders; but, little attention, comparatively speaking, seems to have been paid to this part of medicine in modern systematic works.

You may learn a good deal about slight derangements if you study in the out-patient department of the hospital, or in public dispensaries, and I strongly advise you to take advantage of the opportunities afforded. It is now the fashion to condemn the system upon which the out-patient department of most of our hospitals has long been successfully conducted. To those unacquainted with the facts there seems much that is plausible in the objections raised, but it will be found that the desire, on the part of some enthusiasts in charity organization, to improve the out-patient department of hospitals is complicated with a much stronger desire to do everything to encourage the so-called self-supporting dispensary system, based on the hypothesis that working men and others are degraded if they receive relief from their sufferings without paying something. There is a class of philanthropists whose dictum it is that every one ought to pay for medical advice. The self-supporting system is, in many instances, not a reality, while any one who knows much of the working classes knows that the demand for medical help and medical comforts usually comes at a time when little or no money is being earned. I have seen a great deal of the poor and of out-patient hospital practice, and as I have not met with the so-called evils of the system I cannot advocate the proposed remedies. Many of the energetic legislators in connection with medical charity seem to think that no one who suffers from a pain in his stomach should be relieved until he has paid for help, or is able to prove that he is a necessitous and impecunious person. Up to this time our out-patient departments have been of the greatest service to the poor and of great advantage to those who are studying medicine. It is there

we learn to interpret the curious descriptions given by people, in so many different ways, of the symptoms they experience; there we learn to recognize the difference between apparent and actual suffering; there we are taught to quickly discern different forms of disease, and to acquire that ready method of investigation which is so invaluable in after-life. Moreover some of the hardest workers among us prefer to give our services rather than to receive the pittance which seems to be considered by some reformers as payment for services rendered. Although complaints may be made of the rate at which people are seen and dismissed, the out-patient physician, in fact, seldom misses an important case of actual disease, while of his real use to the poor there can be no question whatever. Slight ailments are prescribed for and relieved, while serious cases of disease are detected and at once transferred to the wards, without those inquisitorial investigations which seem to form a very important factor in model sick-poor relief organization. It is doubtful if, by any system that can be inaugurated, a poor patient can be more quickly relieved and cared for than by the one which has been gradually built up by members of our profession, and is now in useful operation in hundreds of institutions. To teach providence to all classes is very desirable, but we must never forget that our work is to relieve suffering as promptly and efficiently as possible.

There is lastly this very cogent reason which impels me to direct your attention thus early in my course to the consideration of slight ailments. It will be found that many of the principles upon which the treatment of trivial derangements is conducted obtain in the management of graver maladies. This is a matter of the highest practical importance, and in not a few instances you will find that attention to the relief of slight ailments will afford you great assistance in determining the proper course to pursue in the treat-

ment of very serious forms of acute disease. For example, I shall be able to show you that the treatment of a grave disorder, like acute rheumatism, is based upon facts and reasoning which apply equally to slight affections of a rheumatic nature. Fevers and inflammations of the very slightest character afford lessons of the greatest value concerning the management of severe diseases of that class.

There are many valuable points connected with prescribing which are of the utmost importance, and which are to be learnt from the practitioner who is well acquainted with the management of slight ailments. I have often heard the remark that our predecessors knew much more about the treatment of disease than we of this generation do. There is some truth in this; and I am sure that many very old practitioners now living are more successful in relieving the aches and pains of their patients than some of the young ones, who may, nevertheless, have a far more intimate knowledge of the diagnosis of obscure forms of disease, and of the minute pathological changes which have damaged tissues and organs. Those of you who have worked under practitioners enjoy a great advantage in this respect, and will be aware of many things connected with the art of prescribing for symptoms, of which even men who have highly distinguished themselves may be in total ignorance. Nor do I see how this very desirable practical information can be gained in any better way. I may try my utmost to convey to you some of the wrinkles I have learnt from my old masters, but I shall succeed only to a limited extent. It is very well to offer remarks on the details of treatment when the sick person is before us, but to give detailed information as to combinations of remedies in pills and mixtures, and a number of things of considerable importance practically, would be so uninteresting that I could not expect you to listen to me with attention, and I can only venture to

trouble you now and then to note down things which have been frequently found of great value in the management of cases of deranged health.

OF THE TONGUE IN HEALTH, AND IN SLIGHT AILMENTS.

Of the Tongue.—I shall in the first place speak of the characters of the tongue. Few things, it used to be supposed, were of greater importance than the recognition of the varied character which the dorsal surface of the tongue assumes in various cases of actual disease and of slight derangements of health. If you are to form a correct estimate of the value of the wonderful changes in the character of the tongue, you must be well acquainted with the appearance of the surface of the healthy organ, and with the exact nature of the structures which exist commonly upon its dorsal surface. Now, I dare say that few among you have had the curiosity to examine the back of the tongue and see what is to be discovered there by microscopical examination.

If you scrape off a small piece of the soft matter from the dorsum of the tongue, place it on a glass slide, and after adding a drop of water, cover it with a piece of thin glass and examine it under a quarter of an inch object-glass, you will find, though the dorsal surface of the tongue be in a perfectly healthy state, a great many objects of interest, of which I shall have to speak presently.

I dare say that many who tell patients to put out their tongues sometimes do it as a matter of routine. I have known a rather absent doctor tell the patient to put out his tongue several times in the course of a few minutes' medical conversation. Patients are sometimes a little prosy, and if there is not much the matter with them you may not attend as diligently as you ought to do. You lose the thread of the discourse, and while your wits are wandering you may cry

out quite unconsciously, almost as if it were a reflex and habitual action, "Put out your tongue," although the organ has been already several times displayed for your examination.

In health the character of the tongue is very much influenced by the state of the stomach. The mucous membrane, which lines every part of the alimentary canal, is, as you know, continuous with that which lines the mouth and covers the tongue. Whenever there is a little gastric disturbance the tongue usually participates in the change. The relation between the two phenomena is, however, a complex one, and not very easily explained in its details. Of the fact, in very many cases, there is no doubt, as many may easily prove by observations upon themselves.

The appearance of the tongue, as I shall explain more in detail further on, is also in some measure affected by the state of the circulation, by the character of the blood itself, and by the rate at which the epithelium on its surface grows, arrives at maturity, and decays and falls off.

Sometimes the epithelial cells remain intimately adherent to the tissue beneath, upon which they are placed, and from which they seem to grow. The epithelium, or rather a layer of it, is frequently very easily detached, but sometimes it adheres very firmly. If the epithelium on the dorsum of the tongue is very thick and adherent the tongue looks pale, and perhaps *white*. On the other hand if the epithelial layer is very thin the tongue is *red*.

If you look at the under surface and sides of the tongue in the looking-glass you will observe these parts have a deep-red appearance. The epithelium upon the sides and the deep aspect of the tongue consists of a layer so thin that the color of the blood is seen through the epithelial tissue. The degree of redness varies according to the distension of the vessels, just as the redness or pallor of the

skin. In blushing the small vessels of the skin of the cheeks are suddenly distended in consequence of a rush of blood permitted by the sudden yielding and dilatation of the little arteries continuous with them, and the same phenomenon under certain circumstances occurs in the vessels of the tongue.

The Dorsum of the Tongue.—On the dorsal surface of the tongue generally, the epithelium is arranged to form a layer of considerable thickness, so that in many places the red color of the blood is not seen. In health the general color of the dorsal surface inclines to pale red, but in certain forms of disease it becomes of a bright-red color almost like raw beef, and it is sometimes spoken of as "beefy." This seemingly raw condition depends upon the desquamation and falling off of a good deal of epithelium, so that the layer covering the subjacent structures is much reduced in thickness. You can see the red color of the blood through the epithelial layer, and the tongue looks raw.

On the Fungiform and Filiform Papillæ, and of their Epithelial Covering.—In health there are to be seen here and there over the dorsal surface little spots, which are of a bright-red color. Upon more careful examination, it will be found that the red spots are really small papillæ with a constricted neck, in shape resembling that of a mushroom, and known as the *Fungiform Papillæ*. The epithelial investment of the fungiform papillæ is extremely thin, and the bloodvessels and terminal nerve networks are just beneath. The papillæ in question always appear red, and can therefore be easily detected here and there amongst the filiform papillæ which are more uniformly spread over the dorsal surface of the tongue.

The epithelium covering the surface of the filiform papillæ is so thick that we cannot suppose any sapid substances

could quickly pass through it, or between the edges of the overlapping cells, and come in contact with the nerves beneath. These filiform papillæ have probably nothing to do with the sense of taste, but are important organs of touch, much concerned in the process of placing the food in the proper position for mastication and deglutition. It is the fungiform papillæ and the soft red mucous membrane at the sides and back of the tongue, and that of the palate and fauces, which are concerned in taste.

As regards the color of the tongue, it may be remarked, generally, that if the epithelial layer on the organ is thin, the tongue will be red; if very thick, it will be white, or if rather dry of a dull brown or dark-brown color; or if there is an abundant accumulation of soft and moist epithelium upon its surface, of a very opaque dirty white.

Epithelial Hairlike Processes of the Filiform Papillæ.—In the central part of the dorsum of the tongue the epithelial sheaths of the filiform papillæ are very long, and indeed form elongated threadlike filaments, closely resembling hairs in structure. You may snip off a few of these hairlike bodies from your own tongue, or scrape portions of them from the central part of the back of the surface with a knife. The specimen is then to be placed in a watch-glass in a little weak glycerin. After the processes have soaked for a time they may be placed on the glass slide, covered in the usual way with a thin glass, and examined under the microscope, first under an inch power, and then under a quarter of an inch object-glass. You will find these long hairlike processes are composed of layers of scaly epithelium imbricated and superimposed one upon the other. The longest of the epithelial filaments project from the dorsal surface of the tongue, perhaps, for more than the twentieth part of an inch. When we eat, small particles of food often become entangled amongst the epithelial

extensions of the filiform papillæ. If you scrape the central part of the back of the tongue a short time after you have taken a meal and examine the matter as just described, you will almost invariably find a number of oil-globules, and very frequently starch-globules, portions of muscular fibres, and other things, according to the nature of the last food taken.

Of the Epithelial Cells.—The layer on all the papillæ of the tongue varies in thickness from time to time. The several epithelial cells composing the layer necessarily vary in age. The oldest of these cells are those which are outermost, or situated at the greatest distance from the surface on which they grow, and the youngest are those which are nearest the vessels. Passing outwards we meet with cells gradually advancing in age. The oldest are constantly decaying and falling off. These mix with the food, and, no doubt, at every meal we swallow them in thousands. But the old epithelial cells upon the tongue and mucous membrane of the mouth undergo other changes, the general nature of which it is important that you should be acquainted with, and which should be carefully studied as soon as opportunities of making the examination occur.

Of Fungi and Low Organisms in and amongst the Epithelium of the Tongue and Mouth.—If, then, you look at the old epithelial cells detached from the mucous membrane of the mouth, taking a little either from the inside of the cheek or from the tongue, under high magnifying powers (from three to twelve hundred diameters), you will find that these cells contain a number of very minute spherical or oval particles, and multitudes of very delicate filaments. (*Microscope in Medicine*, Pl. XXXVIII, Fig. 1, p. 272.) Now these minute spherical and oval particles, situated in the formed material of the cell, and most numerous at its outer, that is in its oldest part, are fungi in an early

phase of development. They have been called *micrococci*, and have received other names. In this state they have not reached their full development. They are the growing germs of organisms which exhibit different characters in their fully developed state, and each is capable of producing millions of descendants in a few hours. Some of them, probably, under certain circumstances, become elongated, and evolve bacteria of various forms; others may form the long threads which used to be called *Leptothrix buccalis*. (*Microscope in Medicine*, Pl. LXXXI, p. 492.) Some, perhaps, may be the germs of *Oidium albicans* and other fungi. It is probable, indeed, that many different species of fungi may be developed from the spherical or oval germ-particles, existing in connection with the older epithelial cells on the surface of the mucous membrane of the mouth. The germ-particles themselves, although they closely resemble one another in appearance, may have been derived from different species. The germs grow and multiply under different circumstances, and their growth and multiplication have much to do with the appearance which the tongue presents in different cases of health and disease, and in the same person at different times.

It has been stated by more than one observer that *Sarcina ventriculi* is present in the fur of the tongue, but I have never had the good fortune to find this fungus, though I have examined the fur in very many cases during the past thirty years. In cases in which sarcinæ were found in the stomach, I did not find them on the tongue or in other situations. I cannot help thinking that many different bodies have been mistaken for *Sarcina ventriculi*.

Old epithelial cells, like other old and formed tissue or other dead organic animal or vegetable matter, very soon become invaded by low vegetable organisms which grow at their expense and live upon their substance. Not only

in the substance of the cells, but upon their surface, the fungus germs are found, and frequently project from them, forming little collections, which may be detached from time to time.

Amongst the hairlike epithelial processes projecting from the free extremities of the filiform papillæ, are often found masses which have a granular appearance under low magnifying powers; but when examined under objectives magnifying more than three hundred diameters, will be found to consist of millions of spherical and oval fungi or micrococci, grouped together, each little mass of bioplasm being surrounded with, and separated from, its neighbors by clear structureless material.

Amongst the epithelial cells in every part of the mouth you will often meet some long filamentous processes, which, if examined under high powers, will be found to exhibit a number of transverse markings. These grow and freely multiply in the fluids of the mouth at the usual temperature of that cavity. Many are found between the teeth, and in the tartar of the teeth you will meet with numbers of vegetable organisms. Indeed it is probable that the deposition of the tartar is intimately connected with changes occasioned by the living vegetable organisms in question, which belong to the genus *Leptothrix*. (*Microscope in Medicine*, Pl. LXXXI, Fig. 3, p. 92.)

In many cases you will find whole forests of vegetable organisms consisting of different species, and of the same species at different periods of growth, upon the dorsal surface of the tongue. These increase in number in case of derangement of the digestive organs, and in many forms of disease.

The growth and multiplication of these fungi at the very entrance of our bodies, and so placed that they must pass in immense numbers into the stomach whenever we swallow,

is a fact of great significance in connection with certain conclusions respecting the action of these low organisms upon the solids and fluids of man's body. Of late years, the idea that such organisms constitute the active particles concerned in the propagation of contagious disease,—are, in fact, the actual *materies morbi*, has been increasingly popular. The first question you will ask will probably be this: Do these germ particles perform any distinct office or function in connection with the solution of food or digestion, or do they merely live and grow upon the old epithelial cells and the *débris* of the food which must needs undergo change in such a situation, and at the temperature of the inside of the mouth? We find such bodies in animals as well as man, and though they are found in greatest number in certain derangements, multitudes are constantly present in the most healthy individuals. Wherever organic matter is undergoing change and disintegration in an organism, or outside of it, at the temperature of man's body, or some degrees lower or higher than this, and in some cases at a much lower temperature, such organisms exist in countless multitudes, and grow and multiply at the expense of the disintegrating organic matter. At this time of the year (October) there is not a leaf in which you will not find millions of low vegetable organisms in various stages of development and growth. As the organic matter of the dying leaf or plant undergoes change, and the decomposition of its more unstable compounds commences, the circumstances specially favorable for the growth and multiplication of many of the microscopic fungi are established. Fungus germs exist in the air at every part of the earth's surface at all times. Though by no means constantly present in precisely the same amount, some are always to be detected in appreciable numbers, if the air is properly examined. Many coming into contact with the moist surface

of the leaf about to decay, find there a surface favorable for their development. The spores germinate, and from the surface of the tissues of the plant the growth easily makes its way into the substance. But is it not remarkable that any one should believe on the one hand that the decay of the leaves is due to the fungi, or on the other is the cause of their origin and development, growth and multiplication? All that can be proved by facts and observation is, that as the leaf grows old, substances are formed which are easily appropriated by the fungi. The germs of these are present and are ready to develop just at the time when the appropriate pabulum is formed. The fungus does not spring from the leaf, neither is the leaf caused to grow old by the fungus, and its deterioration begins before the growth of the fungus commences. The fungus is in no sense either the cause or the consequence of the decay. And in the case of the higher animals and man, at least in many instances in which low organisms are associated with morbid processes, these last are neither the cause of disease nor are they produced by it. Germs being present, will grow and multiply whenever the surrounding conditions become favorable. If these remain for a considerable time unfavorable, the germs if present remain quiescent and may at last die.

Nor are microscopic fungi found only at this period of the year in connection with dead and decaying vegetable tissue. In the vegetables and fruit we eat are countless multitudes of living growing organisms. Look, for instance, at the cells of a piece of lettuce or of the leaf of the watercress, nay, even in those of the leaf and stem of the young and rapidly growing mustard and cress, you will find, if you examine them under a magnifying power of three hundred diameters or more, millions of little bodies, each of which is capable of giving rise to countless multi-

tudes in a very short time. If you carefully study the revolving living matter of the cell of the leaf of the Vallisneria you will have no difficulty in discerning some of these low organisms in very close proximity to the living matter of the plant itself. So very close, indeed, is the lowest living particles to the highest during its life, that no wonder the material of the latter falls a prey to it at last, and the instant matter ceases to live it is invaded and appropriated by the ever-growing fungus—the most constant, the most unchanging and universal of all kinds of living things,—and of all the survivor, but whether it be the most fit to survive you may determine if you can.

As it is with regard to deteriorating vegetable tissues, so it is with regard to decaying animal tissue. Whether the body be in a state of health or disease, wherever tissue is about to undergo chemical change, wherever decomposition is taking place, or is approaching, the conditions may be favorable for the growth and multiplication of certain low vegetable organisms, the germs of which are present. Long before any changes akin to deterioration and decay are ordinarily supposed to commence, even from the very earliest period of construction and growth, fungus germs are ever present, ready to grow and multiply should death and disintegration of a living particle occur. No wonder, then, that we find so many low organisms growing in connection with the old decaying epithelium of the mouth and of the tongue, of the œsophagus, and other parts. Under certain circumstances, the fungi grow and multiply to a vast extent lower down the alimentary canal, as I shall presently explain. We cannot suppose that such organisms do any harm; for cases in which the alimentary canal seems to be almost filled with them recover, without any damage to any textures having been occasioned.

I have never studied the epithelium from the mouth of a

savage, but, without having actually looked, I think I may feel pretty confident that low vegetable organisms would be found growing in the cells of his mouth just as they grow in our own, and the species are probably precisely the same.

In lower animals, organisms of the same general character abound. If you examine the tongue of the dog or of the cat, of the sheep or of the ox, you will find that the same sort of changes are constantly going on. Everywhere the old epithelial cells are being invaded by low vegetable organisms, which grow and multiply as they do in the epithelial cells of man himself. Multitudes, of course, pass down into the stomach, and, under ordinary circumstances, many are probably destroyed during digestion by the action of the gastric juice and bile, and other fluids, which are poured into the alimentary canal. Those that are not destroyed certainly do no harm. In the healthy state they either do not grow and multiply at all, or only to a very slight extent.

In the case of the lower animals the introduction of fungi into the stomach goes on constantly and upon an enormous scale. Every mouthful of water consumed by sheep, oxen, and other animals, teems with myriads of low vegetable and animal organisms in various stages of existence; and in the food they take, fungi in various stages are present, as well as the sporules of many different species. These low organisms are, therefore, always passing into the bodies of the animals in countless multitudes. But although millions of living fungi are always entering the alimentary canal of man and animals without doing harm, and probably without growing and multiplying there to any great extent, there are circumstances under which a very different state of things is observed. If the stomach is out of order, if the bile and other secretions are deranged

or are not poured into the alimentary canal in proper quantity, phenomena totally unlike those characteristic of the healthy state are induced. Many an infant suffers from the extraordinary development of bacteria in the alimentary canal, and some children die from the state of things thereby engendered. But the bacteria cannot correctly be regarded as the point of departure from the abnormal state. That is to be sought in the secretions and in the action of the glands prior to the multiplication of the organisms. I have seen every part of the stomach, small and large intestine, filled with curdled milk which had not undergone the slightest digestion, and every particle of which, when placed under the microscope, seemed to be almost composed of bacteria, so abundant were these bodies. Sometimes, however, bacteria grow and multiply in the milk of the mother while it yet remains in the breast, and the changes effected in the milk by them, it need scarcely be said, render it quite unfit for the sustenance of the infant; and, were it taken, would, except perhaps in the case of the very strongest children, give rise to very serious derangement of the digestive organs. But, in this case, the maternal secretion must have been out of order, or the bacteria would not have grown and multiplied in it. For it is certain that in such secretions and in the glands that produce them, bacteria germs are always present.

In face of such facts, it is difficult to accept the doctrine that bacteria, fungi, and such like low organisms are noxious agents, or are of themselves productive of harm to the organism into which they pass. It is astonishing that, notwithstanding facts like these, which can be verified by any one—facts with which many of us have been familiar for the last thirty years and more—should at this time be unknown to, or somehow escape the cognizance of some who have been recently studying the life-history of these

very organisms. The knowledge of such broad general facts renders it difficult, I think, to accept offhand the doctrine that such organisms are somehow intimately connected with the origin and communication of many of the most serious diseases of man and animals. Of late years, however, the theory that such organisms, which are invariably present in all decaying healthy normal structure, or closely allied organisms, or their pathologically modified descendants, constitute the actual poison of most of the contagious diseases which invade us, has spread far and wide, and has been accepted by many as a general principle.

There is, probably, not a part of the body of any one of us of a quarter of an inch in diameter where bacteria germs are not present. Certainly, every time we eat, myriads are carried into our alimentary canal; and every time we breathe, except in the very purest atmosphere, multitudes pass into the air-passages. So small are these bacterial germs, that they would pass without the slightest difficulty through basement membrane and through the interstices of any of the tissues of the organism; and yet the public is taught that there is some intimate connection between bacteria and morbid phenomena. Erroneous teaching is spread far and wide by sensation lectures, under such a title as "Dust and Disease," but that dust which causes disease is of a most exceptional character. As a fact, ordinary bacteria are harmless enough; they exist in us without disturbing us in any way, but they only grow and multiply in great numbers when circumstances become favorable. I can give you positive proof that bacteria germs exist not only upon the surface of the skin and mucous membranes, but in the internal organs, in the interstices of healthy tissues, and in the blood itself. Some years ago I examined the layers of a fibrinous clot which had been slowly formed

from the blood in the interior of a large aneurism of the aorta of a man who died of the disease. The body was examined six or eight hours after death. The aneurism had existed for many years; and probably some of the layers of fibrin which had been deposited were almost as old as the aneurism itself. Now I found that in all parts of the firm, laminated, leather-like material, which served to greatly increase the thickness of the wall of the aneurismal sac, there were indications of disintegrating changes having taken place. Upon carefully examining minute pieces of the fibrin under high powers, multitudes of bacteria and their germs were discovered without difficulty. But the older layers in the outer part were here and there softened, and portions of the fibrinous matter seemed eroded, many small masses of soft and broken-down material being present. All these teemed with bacteria, moving, growing, and multiplying.

Now these bacteria, like the fibrin in which they were growing and multiplying, were very close to the blood and within the vascular system; internal to the various tissues constituting the wall of the vessel, which was dilated to form the aneurismal sac. The bacteria must have been growing and multiplying in the lifetime of the patient, and probably for many months before his death occurred. They could not have got into the position in which they were discovered from the outside, for it is hardly conceivable that such an organism as a bacterium could have found out, while outside the body, that within the vascular system there was material suitable for its growth and multiplication. Neither is it possible that bacteria could have made their way from without to the situation in which they were found, nor could they have effected in the course of a few hours, the extensive erosions and softening discovered. Such theories could not be sustained with any show of

reason. The only conclusion, therefore, which is in accordance with the facts of the case and with common sense, is that which I have before adverted to, viz., that bacteria germs exist at all times in all parts of the body, even in the blood itself during the healthy state.

I conclude that as long as the normal state of things exists, the living bacteria germs in all parts of the organism do not grow and multiply, but that when any change occurs of the character of that which results in chemical decomposition, these bacteria germs multiply. This multiplication proceeds, although we are alive, just as it takes place in dead animal and vegetable matter. And it will occur in every part of every one of us a very few hours after death.

So that you see if bacteria germs constitute the actual material of contagious disease they must be peculiar. The ordinary bacteria grow and multiply enormously without causing any disease at all. Bacteria germs, low fungi, and low algæ exist in connection with the tissues and fluids of every human organism, and millions of these are present during every moment of existence in health on the surface of the dorsum of the tongue. Multitudes, as I have said, pass down the alimentary canal every time we swallow food or fluid. Such ordinary bacteria and their germs do us no harm whatever. But please do not infer from what I have said that putrid fluids loaded with bacteria are innocuous or to be recommended. Organic matter in a state of putrefactive decomposition when introduced into the alimentary canal gives rise to pathological phenomena irrespective of the bacteria it may contain.

That neither the ordinary bacterium nor common allied forms, nor the germs of these have anything to do with exciting disease may be regarded as certain. The bacterium and its germs are intimately associated with every kind of

animal and plant, in the healthy and morbid state and during every period of existence, from the earliest embryonic state to the time of death at the most advanced age. Whether it is some special bacterium which directly causes the results consequent upon the introduction of specific poison into the organism, or whether the active particles are of a totally different nature, altogether independent of bacteria and allied organisms, is still an open question. Some evidence has been recently adduced in favor of the hypothesis that there are bacteria and bacteria—that the real contagious bacterium is an organism altogether apart from the harmless bodies so intimately connected with every part of every one of us. Further, it has been surmised that the horrible death-carrying bacteria of various orders have been somehow derived from the harmless form by pathological transformations, or developed in the course of evolutional struggles proceeding through the ages, or that they are the product of a constantly altering environment. But many new facts must be discovered, and much must be learnt concerning special bacterial phenomena before the problem can be solved. I have only ventured to cursorily allude to the important question here, in order that in considering it you may keep prominently before your mind's eye the one universal, ever-existing, unchangeable organism, which perhaps the first formed of all life has outstood every change, and may be destined to outlast every other living form, which is domiciled in every organism on the face of the earth, and is found in almost every kind of food and drink, which flourishes in the human mouth, and the germs of which are to be found in every part of man's body.

The Tongue in Various Derangements.—I shall now proceed to consider more in detail the changes which occur in the tongue, which are of special interest to us, and the peculiar characters assumed by the organ in different states

of health. The subject has received great attention from the very earliest ages, and not only from medical practitioners. It is in all respects worthy of your most attentive consideration. Not a few persons ignorant of medicine have been in the constant habit of studying the state of the tongue. To many it is a matter of grave anxiety through life, and men have been known to use the looking-glass every day for half a century or more for the purpose of observing the daily changes which occur. Especially does the tongue excite the greatest attention and interest among the members of that large section of civilized man, which knows not what it is to feel perfectly well, to be free from discomfort and not to ail anything.

It has been already stated that changes in the tongue are frequently associated with somewhat similar changes occurring in other parts of the very extensive system of mucous membrane concerned in the preparation, digestion, and absorption of food. We have now to consider how these changes are probably occasioned. One part of the tract may participate in the phenomena occurring, it may be, at a considerable distance in tissue of the same general character. This participation is doubtless due to the circumstance that the nerve-centres presiding over the several actions occurring in different parts of the alimentary canal are connected together. The actions of the numerous minute nerve-centres are also harmonized and co-ordinated by intercommunicating cords.

The extensive gastro-intestinal tract of mucous membrane is supplied with one system of nerves, the great characteristic of which is extensive distribution and intimate intercommunication—so that when one portion is deranged the action of others is often disturbed. In the case of actual disease a local affection of very limited extent often disturbs the action of twenty or thirty feet of intestine and

affects the character of secretions from gastric and intestinal glands at a great distance from the actual lesion.

Very slight changes as regards diet will cause diminution of the secreting action of the stomach glands. The mucous membrane often becomes less moist than it should be, and the secretion from every part diminishes, though it would be incorrect to say that it became dry. The mucous membrane of the mouth and the glands connected therewith participate in the altered action of the stomach. In practice we invariably find that in fevers and indeed in any slight attack of feverishness, when the temperature of the body rises only two or three degrees, in short in that common condition which every body has experienced when he takes cold,—there is imperfect action and deranged secretion in the stomach. For several hours, it may be for two or three days, there is defective formation of the substances which form the all-essential constituents of saliva, of the gastric juice, and other secretions poured into the intestinal canal. The consequence is the ordinary desire for eating is not present, and if the person eat well in spite of his disinclination to do so, further derangement, perhaps severe pain and indigestion, add to his troubles if he has not the good fortune to escape by freely vomiting or by the occurrence of diarrhœa, or both; so that under such circumstances the best plan is to starve or, if weak and feeble, to take milk, beef tea, or strong soup in very small quantities, at short intervals of time (an hour or two hours) until healthy action returns.

It is probable that under the circumstances I am considering, the various materials out of which the mucus which is secreted on the surface of the mucous membranes and by the glands, are not separated from the blood, or are present in an altered state. In fevers and even in slightly feverish conditions, those complex compounds from which the cells

of the salivary glands form saliva, and those out of which the gland cells of other parts of the alimentary canal develop those marvellous and peculiar substances which play so important a part in digestion and ultimately in nutrition, are not drawn from the blood through the walls of the vessels. This deranged action of an extensive system of glandular organs necessarily affects the composition of the blood (which also suffers in other ways), and thus the action of every tissue and organ in the body becomes more or less disturbed.

When we come to consider the nature of the changes occurring in feverishness, we shall see that in all fevers, and in every febrile condition, digestion and the action of the alimentary canal are invariably disturbed, and often to an alarming extent. Every intelligent mother knows that in infants and children the febrile state often commences with derangement of the stomach, and may be occasioned by improper food, as, for example, by hard unripe apples. In this way important alterations in the blood and general derangement of the system result from pathological phenomena starting from the disturbed action of, it may be, only a small portion of the mucous membrane of the alimentary canal.

Under such circumstances, it is important that the organs whose action is disturbed should be allowed to rest for awhile. You will find after a time there will be good evidence of returning action, and possibly undue action. A greater amount of action than takes place in health may be noticed, but this is soon followed by the proper degree of action. Gradually the normal state of health is restored without any permanent lesion or structural change of any kind having been induced. Now in such derangements, if we can by any means cause the return of secreting action, if we can get these various glands to act freely, the abnor-

mal condition will be relieved, and the normal or healthy state restored, sooner than if matters are left to right themselves. This will be an advantage to the patient. I think I shall be able to convince you that we can be of use not only by causing the irritating matters to be rejected from the stomach or expelled from the bowels, but also by diminishing the febrile condition in these cases, and in others in which its development is more obscure and difficult to trace. It will be well for me, before further discussing this part of the matter, to draw your attention to one or two other points of general interest in connection with the febrile state.

In an ordinary cold the mouth is often more or less dry or clammy, the throat, as you know, seems dry and rough, and the appetite becomes impaired. There is little gastric juice under these circumstances, and probably the quantity of intestinal fluid that ought to be secreted is much less than usual. You will also notice, if you pay attention, that the kidneys do not secrete in the normal degree, while the bowels are often constipated. Now you will find, when you are suffering in this way, that if you take a warm bath or a hot air or vapor bath, so as to excite the free action of the skin, the unpleasant sensations cease, and at least for a time you feel very much better, or you may even experience complete relief. If you take a few doses of Nitrate of Potash, or Bicarbonate of Potash, or Liquor Ammoniæ Acetatis, or some other saline, which acts on the skin and kidneys, you will be greatly relieved.

This relief is, I think, consequent upon the removal of certain substances from the blood which have been accumulating in that fluid to its detriment, and which as they circulated caused derangement of action in many tissues and organs in the body. I shall have frequently to direct your attention to the general and often widespread changes

which result from deranged action confined to a very limited area, and shall show that at least in a number of cases, this may be explained by the alterations induced directly or indirectly in the character and composition of the blood. Hardly any of the ordinary physiological changes of the body can be deranged without some alteration taking place in the character of the blood, and in consequence the action of the digestive organs is disturbed, and of this we soon have indications in the loss of appetite and various unpleasant sensations in the stomach, and by the altered state of the tongue.

Of Dry and Moist States of the Tongue.—One of the commonest changes observed in the tongue is undue dryness, a condition which, however, may depend upon a variety of circumstances. The moisture of the parts within the mouth varies greatly, and even, in most persons, the mouth is not equally moist at all periods of the day and night. The activity of the process of secretion varies much at different times; the quantity of fluid in the interstices of a thick tissue like the skin or the dorsal surface of the tongue is by no means always the same, and varies with every change in the tension of the walls of the capillaries, the pressure of the circulation, the activity of the lymphatics, and a number of other circumstances. Lastly, it is obvious that the varying rate of evaporation from the mouth and nasal passages will alone cause alterations in the tongue as regards its moisture.

The dryness of the dorsal surface of the tongue, a change which is not uncommon in many forms of disease, cannot be attributed only to changes taking place upon the surface of the mucous membrane, for the secretion of fluids by the glands beneath might entirely compensate, or more than compensate, for the loss of fluid by evaporation. In many cases the dryness seems to be mainly due to alterations

which take place beneath the mucous membrane, partly in connection with the nutrition of the deep cells of the cuticular coverings of the papillæ, and partly upon change in the composition of the blood itself and an altered state of the blood distribution, as determined by dilatation of the little arteries, consequent upon relaxation of the circular muscular fibres caused by change in different parts of the nerve apparatus governing their calibre.

The ordinary moist condition of the tongue in health depends partly upon the transudation of fluid through the walls of the vessels to the epithelial and other tissues, and partly upon the presence of fluids secreted in varying quantities and poured into the cavity of the mouth, the saliva for example. The surface of the tongue and inside of the mouth are thus kept moist, but the moisture of the tongue and interior of the mouth will be very much favored if the air we breathe be moist, while in the opposite state of things the tendency will be for the tongue to become dry; and obviously a greater amount of fluid will be required to maintain the mouth in a moist state in dry than is necessary in damp weather. But the degree of moisture communicated to the air is liable to variations according to changes in the body. The blood as it traverses the capillaries of the lungs contains at different times very different quantities of fluid, and therefore during some periods of time much more vapor will be given off from the blood to the air about to be expired than at any other periods. Not only so, but the rate of exhalation of watery vapor from the blood is influenced by a number of complex conditions, which I must not attempt to consider here in detail, but which should not be altogether omitted.

Every time we expire, the air laden with moisture is driven over the mucous membrane. However dry the inspired air may be, it becomes nearly saturated with moisture

when it leaves the air-cells of the lungs. This damp air playing over the surface of the tongue assists in keeping it moist.

The mouth and tongue, however, may readily become dry, and a very unpleasant state of things is experienced. Those who sleep with the mouth wide open frequently suffer from the derangement in question. This habit of sleeping with the mouth open is a very bad one. We should get into the habit of closing the mouth before falling asleep, and we should breathe freely through the nose. In cold weather it is important that the air should pass over the surface of the mucous membrane of the nasal passages, before it reaches the windpipe and lungs, in order that it may be warmed. The air in traversing the moist passages also receives a supply of moisture, and is thus better adapted for the further changes induced by respiration, which process, as you are no doubt aware, is most actively carried on during the period of sleep. Always advise people to get into the habit of keeping the mouth closed and breathing through the nose, not only during sleep, but generally, for especially in cold weather it is important on many grounds that the air should take this circuitous route rather than the more direct one by the mouth.

As soon as the mucous membrane of the mouth or adjacent passages gets dry, a desire for fluid will be experienced. The person longs for a little water, and when he gets it he moves it about in all parts of the mouth, so as to thoroughly moisten the mucous membrane; but this operation requires to be very frequently repeated, as the surface when moistened with water gets dry much sooner than when bathed with the natural fluids of the mouth. In such cases you will find glycerin and water, in the proportion of one part to five or six, more effective.

When the mouth is dry, articulation becomes difficult or

impossible. No one can speak properly if the mouth and tongue lose much of their ordinary moisture, and you may have noticed that many who are accustomed to address audiences for a considerable period of time are obliged to sip water every now and then. Some speakers are seen to take a few drops of fluid every four or five minutes, and I much fear that in some of these cases the extra dry state of the mucous membrane has resulted from having introduced during a long period of time too much alcohol into the system, a practice which leads to changes in the blood, and at length to impairment of the action of most of the secreting glands. At the same time it must be noticed that even in perfect health, the quantity of saliva that flows into the mouth, varies remarkably at different times, and the proportion is diminished in many little derangements of the system. The mouth feels dry and uncomfortable until the free secretion of the salivary fluid is resumed.

Of Exciting the Flow of Saliva.—In many cases in which the secretion of saliva is deficient, the action of the salivary glands may be excited in a very simple manner. Anything which increases the flow of saliva and induces the glands of the mouth to secrete more freely will, to some extent, relieve a dry state of the mouth and tongue. Commonly, the mere irritation, stimulation, or excitation of the sensitive nerve fibres spread out beneath the epithelium of the mucous membrane of the mouth, brought about by the contact of some pungent or acid material, is sufficient to cause a very free secretion of saliva. A small piece of lemon just placed in the mouth will often give rise to a very free flow of saliva; and there are various pungent materials which are introduced into the mouth for the very purpose.

Indeed the mere moving about in the mouth of some solid body such as a smooth pebble will, by reflex action, promote the secretion of the saliva. The pebble acts upon

the nerves and excites by reflex action, not only the expulsion of the secretion already formed, but increased secretion of the salivary fluid by the gland-cells.

Sialogogues.—We have many remedies which belong to the class of Sialogogues (σιαλον, saliva, and αγω, I expel). *Horseradish*, *Mezereum*, *Ginger*, *Pyrethrum*, the root of *Anacyclus Pyrethrum*, the old *Pellitory of Spain*, are examples of well-known sialogogues. But there is one better known to most of you, though its use as a sialogogue is, in these days, almost entirely limited to some of the nautical people, I mean *tobacco*, which, if used at all, should be smoked, not chewed, and smoked only in moderation, and in the open air.

Certain salts also excite the secretion of the salivary glands. *Chlorate of Potash* and *Nitrate of Potash* are among the best. Sucking *fused nitre* (nitre balls) is an old and very favorite method of treatment for many slight ailments. You may now get *Nitre*, *Chlorate of Potash*, *Bicarbonate of Potash and Soda*, and a number of other useful saline remedies, compressed into small lozenges or pilules containing five grains each. One or two may be allowed to slowly dissolve in the mouth three or four times a day, half an hour or more after a meal, and you will find they will cause a very free flow of saliva. When the mouth becomes very dry at night, it is a good plan for the sufferer to sip now and then a little cold *Linseed tea*, flavored with lemon-juice and sweetened with glycerin. Or, a mixture of the latter with water,—one of glycerin to five or six of water may be used. But the most important and most potent of all our medicines used for increasing the action of the salivary, and most, if not all, other glands of the body, is mercury. You will find, when you have to prescribe for a dry uncomfortable state of the mouth, that if you give only half a grain of calomel, or even considerably less than this, within five

or six hours a free secretion of the saliva into the mouth will occur, and the mucous membrane of the mouth, fauces, and neighboring parts will become moist and more comfortable. All the little labial and buccal glands will also secrete more freely. Instead of *Calomel* you may give one or two grains of *blue pill* or *gray powder*. The last, *Hydrargyrum cum Creta*, is the mildest and perhaps the best of all the mercurial preparations we use. In children's ailments it is one of the most useful remedies handed down to us. In the days of my apprenticeship, we used to keep equal parts of powdered *Rhubarb* and *Hydrargyrum cum Creta* already mixed, and give from one to six grains to children according to age. I continue to find this a most useful prescription. The only objection is its nastiness, even in jam; but for older children and adults the powder may be made into pills with a little *Extract of Henbane*.

White Moist Furred Tongue.—In some conditions the tongue presents a very peculiar appearance, being very white in consequence of the accumulation of a quantity of soft moist epithelium on its surface, with mucus and secretions, bacteria, fungi, and the *débris* of food. This state of tongue is seen in its most remarkable degree of development in acute rheumatism. We have, unfortunately, many opportunities of studying the tongue in this serious malady in the wards of our hospital, which are not often free from several well-marked cases of the disease.

I do not know anything you can do in the hospital, tolerably early in your student days, that will be of such real use to you afterwards, as making observations upon the characters of the tongue in different forms of disease. I strongly advise you, with the permission of the house physician, to go into the wards when he makes his visits, and institute a careful examination of the tongue in several well-marked cases of disease. Describe what you see, and repeat the observa-

tions, on each case, every day or every other day. It is better not to undertake more than two or three cases at one time. Make microscopic examinations of the fur every now and then, and keep careful records and drawings of the results. From time to time you will notice how frequently improvement in the state of the patient coincides with, or is just preceded by, satisfactory improvement in the state of the tongue.

Of course you will meet with exceptions, and you will easily find cases which might be adduced in favor of the doctrine that the appearances of the tongue are so variable and so uncertain that nothing is to be gained by taking note of the state of the organ. To rely exclusively on changes in the tongue would undoubtedly be unwise and misleading, but not more so than it would be to observe exclusively other individual signs and symptoms of disease. We do gain important information from the tongue, and I strongly advise you to study its changes.

Anæmia (*α*, priv., *αἷμα*, blood, literally bloodlessness. In anæmia the blood is poor and defective in red blood corpuscles). In *anæmic* persons and in those suffering from various forms of disturbed digestion, the tongue is flabby, the vessels being imperfectly filled with blood, and the blood itself poor. The dorsum of the tongue appears pallid with a quantity of moist epithelium adhering to its surface. The tongue itself is sometimes visibly larger, swollen or sodden, œdematous (*οἴδημα*, from *οἰδέω*, to swell) as well as soft and flabby. The edges are much indented and marked with impressions of the teeth. This state of tongue improves under the influence of quinine and other tonics, and remedies which improve the digestive power of the stomach.

In Slight Chronic Rheumatism (Rheuma, *ῥέω*, to flow) the tongue is frequently white, covered with what we call a

thick blankety fur. The white furred tongue is more moist than is the organ in the normal healthy state; the epithelium is abundant and sodden, and everywhere invaded by fungi. Numerous low organisms are actually growing and multiplying very rapidly in the moist, soft, imperfectly formed epithelium, which continues to be developed and accumulate while the rheumatic state lasts. Organic matters of various kinds collect and decomposition takes place in the spongy mass which is formed in such great abundance. The various fluids of the mouth also contribute to produce the remarkable thick white fur so characteristic of the disease.

In many temporary derangements of the stomach and bowels we also find this moist furred condition of the tongue lasting it may be for a few days only at a time. The tongue of inveterate smokers is always dirty. Some persons constantly have a foul tongue but are nevertheless in good health. Although we cannot allow that all their functions are discharged perfectly, a constantly dirty tongue, like some other departures from the normal state, is not incompatible with considerable vigor, good working power, and longevity.

Bright-red Tongue.—In striking contrast with the white blankety tongue is the red tongue, which occurs in certain forms of fever, the surface being smooth, of a bright-red color, sometimes looking raw, and dry, and glazed. This red tongue is often seen in scarlet fever. In the early stage of this fever the tongue is often furred, and the red fungiform papillæ are seen to project through the adherent epithelium as bright-red spots. But in a few days the superficial layers of epithelium of the tongue and of the lining membrane of the mouth and fauces are detached, desquamate (*de*, from, *squama*, a scale), and then the whole surface of the tongue is red. The fungiform papillæ are swollen and the vessels much distended, the surface more or less uneven, and we

have the appearance somewhat resembling that of a strawberry—hence, *the strawberry tongue.*

The smoothness and redness of the tongue last for some time, for the old cells of epithelium having been completely detached, some time must elapse before the new cells have sufficiently accumulated to prevent the red color of the blood being so distinctly seen in the vessels beneath. The raw beefy character of the tongue is also observed towards the close of many exhausting diseases, as phthisis (*ρθίνω*, to corrupt), and some forms of pyæmia. Aphthous sores also form sometimes in conjunction with this state of tongue, and must be treated as described in page 64.

The Dry Brown Tongue.—Strictly speaking the dry brown tongue is hardly ever seen in slight ailments, and I shall only say a few words about it here for convenience sake. A state of things somewhat resembling it may result from sucking liquorice, black currants, or black cherries; and other dark fruits may produce temporary staining of the tongue. These give to it a very peculiar appearance, which you ought to be able to recognize at once.

In typhus and typhoid fever, and many other low conditions, the tongue may become brown, or more or less black, owing to changes occurring in the epithelium, which, with mucus and secretions from various glands, has accumulated upon its surface and has become very dry, If the feverish condition reaches any degree of intensity, as I have already told you, the moist surfaces about the mouth very frequently become dry. They are no longer bathed with the healthy moisture, and the secretion of the salivary and other glands is diminished to such an extent as to render the process of deglutition (the swallowing of the food) extremely difficult.

This is one of the reasons why patients suffering from fever have to live upon slop diet. All the nutrient matter required by them should be introduced in actual solution,

or in a very moist state, in the state of pap; or finely divided solid matter may be suspended in beef tea, soup, or milk. In the last, as you probably know, some nutrient materials are dissolved, while others exist as very minute particles suspended in the fluid, and therefore in a state in which they are very easily absorbed into the blood.

In some cases great relief will be afforded if the nurse will occasionally paint, as it were, the dry mucous membrane of the tongue and mouth with a little weak *glycerin and water* (one part to nine or ten) with a camel-hair brush. This is very necessary in some severe forms of fever in which the tongue and mouth become very dry and painful. After the tongue has been dry for several days, it is not unusual for deep fissures to form upon its surface, and the fissures sometimes go quite through the mucous membrane, and even reach the vessels and nerve-fibres in its substance. The escape of blood (hæmorrhage) results, and adds to the dry brown matter accumulating on the tongue. Sometimes much of the hæmoglobin of the blood is disintegrated and makes its way through the capillaries without rupture, but more generally the blood escapes from the capillaries in the usual manner, in consequence of overdistension and rupture. Unless sensation is numbed by the presence of morbid substances in the blood, the occurrence of the fissures is associated with much pain and distress.

The blood from the vessels and the viscid mucus which collects upon the tongue and lips, form dark brown or black masses (*sordes*, from the Latin, *sordes*, dirt, filth), which accumulate about the mouth and often firmly adhere to the surface of the teeth.

The dry brown tongue passes by gradations into the black tongue, characteristic of some of the very worst forms of fevers which occurred in former days, and now are occasionally met with in the East.

As the severity of the fever diminishes, the tongue begins to clean, usually first at the edges. This "cleaning" results from the growth of new epithelium below and the detachment of the old cells with mucus, fungus growths, and particles of food, and probably a little blood—which have been accumulating and adhering to the surface during the illness. As convalescence approaches all this is cast off. To prevent the *débris*, etc., being swallowed, the mouth should be frequently rinsed with *Condy's Fluid* and water (one teaspoonful to a tumbler of water), or a very weak *Solution of Sulphurous Acid* (one part of the *Sulphurous Acid*, *Acidum Sulphurosum* of the Pharmacopœia, to five or six parts of water), or of *Hyposulphite of Soda* (five grains to an ounce of water).

Hæmorrhage.—Just now I used the word hæmorrhage, and as this was, I think, the first time I have had to employ the term, it is desirable that I should explain its meaning and tell you exactly what happens when *hæmorrhage* takes place. The word is derived from two Greek words, *αἷμα*, "blood," and *ῥηγνύμι*, "to break forth." Hæmorrhage means, therefore, a breaking forth of blood. In former days we used to be told that there was such a thing as the passage of blood corpuscles through the closed membrane, through the walls of vessels, in some mysterious manner without any rupture or solution of continuity in their walls. This was called *hæmorrhage by exhalation*, and in my student days the opinion was still entertained that red blood corpuscles could traverse a capillary wall by "exhalation." At an earlier period, the capillaries used to be spoken of as exhalant vessels, and their function was regarded by some as opposed to that of the absorbents.

Under certain circumstances blood corpuscles may pass through the thin walls of capillary vessels without the vessels being destroyed or permanently damaged. In all cases,

however, an opening in the vascular wall does occur; not that the capillary is actually torn across, but when it becomes very much distended by the accumulation of blood within it, the thin vascular walls are much stretched, and longitudinal rents or fissures result, through which the blood corpuscles, a few at a time, easily escape. When the pressure was relieved, the elastic wall would contract and the fissures close up, the capillary transmitting the blood as freely as it did before.

The term *hæmorrhage*, then, is strictly correct, and means the breaking forth of blood from a vessel, large or small.

Chronic Cracks and Fissures of the Tongue.—This state of tongue is very common in persons who have long suffered from weak digestion. The tongue is rather pale, quite moist, and from time to time becomes covered with white fur, often distributed in patches. The cracks are usually rather deep, very irregular in arrangement, and differ much in number in different cases. For the most part they are permanent, but occasionally new ones form and the older ones increase in depth. The papillæ at the edges of the fissures occasionally become sore. Aphthous patches of irregular shapes appear and increase in size, extending often to the bottom of the fissures, and sometimes the tongue becomes so sore that eating solid food is a very painful operation. The cracks may go on separating until a raw surface is exposed at the bottom. This is exquisitely painful; and if any alcohol, cayenne pepper, or salt substance is taken, the almost bare nerve fibres exposed in the fissures are instantly affected. A moderate degree of the condition of tongue referred to is extremely common. I do not know that it interferes with longevity or predisposes to any more serious derangements. Those who suffer in this way are obliged to be very careful in diet and must live

very moderately. If they exceed in any way digestion becomes much deranged, the tongue gets foul and very sore, and some days must pass before the general state of health returns. In such cases the bowels are usually sluggish, and you will generally find that mild purgatives only can be borne. Three or four grains of *compound rhubarb pill*, two or three nights running, with perhaps a little *effervescing citrate of ammonia*, soda or potash, or some such simple saline, three or four times daily, will be of use, and expedite the return of the normal state. Carbolic acid lotion (one part to one hundred of water) is also a good application, especially if the fissures are associated with the presence of aphthous spots, with vegetable growths on the surface. See also page 64.

There is, however, a form of cracked tongue common enough and very chronic, which is not to be cured in this simple manner. There are cracks and fissures, but in some situations the surface of the tongue is too smooth. The appearance is such as to lead one to think that, in the course of very slow pathological changes, many of the papillæ have undergone change, and have at last wasted and disappeared, just as the villi of the small intestines do in certain forms of disease. The state of tongue which I am considering lasts for years, getting better and worse again. It is usually relieved, and in not a few cases cured, by *Iodide of Potassium*. The remedy must be taken for two or three or more weeks at a time, then stopped for a short period, and resumed again. You may begin with two grains, and gradually increase the dose to five or six grains, and it is a point to give it dissolved in as much as half a pint of water. Some cases improve more rapidly on *Iodide of Mercury*. You may give from the thirty-second to the sixteenth of a grain of the *Perchloride of Mercury*, that is from thirty to sixty drops of the *Liquor Hydrargyri Perchloridi* with five

grains of *Iodide of Potassium*, and a little *Syrup of Ginger*, and perhaps twenty minims of *Battley's Liquor Cinchonæ* in four ounces of water, an hour after food, twice or three times a day, for two or three weeks at a time. These cases, and especially if they are cured by the medicine I have recommended, are generally considered to result from syphilis, but I feel confident that all are not of this nature. It is a grave mistake to suppose that everything cured by mercury and iodide of potassium must be syphilitic in its nature and origin. These remedies are most useful in the treatment of many conditions which have nothing whatever to do with this malady. Some who read these words will, however, assure me that I am mistaken, and that in cases in which the patient never had an attack of syphilis the poison was introduced into the organism one or more generations back. This I cannot disprove, but it is a mere dictum, resting on no sound foundation of fact and observation.

Changes in the Mucous Membrane of the Mouth and Fauces.—Associated with the changes taking place in the tongue, we have in many cases, also, corresponding changes in the mucous membrane of the mouth, the palate, the fauces, and the throat. The mucous membrane, of all these parts, is continuous, and no wonder the different sections are affected in the same manner. The action, also, not uncommonly extends downwards through the narrow chink of the *Glottis* (*γλῶττα*, the tongue) into the *Larynx* (*λάρυγξ*, the larynx) and windpipe, or *trachea* (*τραχύς*, rough). The voice becomes hoarse, in consequence of the mucous membrane being swollen, dry, and otherwise altered. Not unfrequently this dryness extends to the *posterior nares* and affects the mucous membrane at the back of the nose, giving rise to a very painful sensation, a slight degree of which most have experienced when an ordinary cold is about to come on.

If you look in the looking-glass at the back part of the widely opened mouth, you will see the mucous membrane is more red than usual, and here and there it appears glazed and dry. Not only so, but if you try a simple experiment you will discover that an important change has taken place in the sensitiveness of the surface. In health the slightest touch will excite movement of deglutition by reflex action, but when the mucous membrane is dry and sore no such contraction of the pharyngeal muscles (*φάρυγξ*, the throat) ensues. You may touch the palate firmly without any effort to swallow being excited. This benumbed state of the highly sensitive surface is only temporary, and consequent upon the changes which have occurred just beneath the epithelium, where extremely delicate afferent nerve fibrils are distributed in immense numbers.

In derangements of the kind, the application of astringent substances to the palate and fauces often affords relief. You may apply with a camel-hair brush a little of the *Glycerin of Tannic Acid*, the *Glycerinum Acidi Tannici*, or a solution of *Nitrate of Silver* (five to ten grains to the ounce of distilled water), three or four times daily. A few minutes after application the mouth should be gargled out with cold water or salt and water (one teaspoonful or more to half a pint); but the best plan of treating such affections, especially if they are chronic, is the direct application of the astringent or other solution, in the form of *spray*, as I will now describe.

Of the Use of Spray.—Of late years very many remedies have been applied to parts about the mouth in the form of spray, and great advantage has resulted. The practice was first employed in the treatment of diseases of the larynx, and many very ingenious instruments were invented for the purpose of obtaining a cloud of watery vapor in a very minute state of division. *Spray producers* have of late been

very much simplified in structure, as well as being rendered much more perfect. There are two principal forms of apparatus. One in which the spray consists of high pressure steam, and water with the required substances dissolved in it, and minutely divided into spray by the steam as it issues from a tube communicating with a reservoir, the steam being obtained by boiling water in a strong copper boiler heated by a spirit-lamp. In the other, the requisite degree of pressure required for sufficiently comminuting the liquid to be converted into spray is obtained by a little india-rubber ball bellows. Both forms may now be obtained of the surgical instrument makers for a few shillings, and are well adapted for use in the treatment of affections of the mucous membrane of the mouth, throat, nose, and larynx. The solution containing the material to be projected against the mucous membrane may be much stronger if the steam spray producer be used than if the air instrument be selected, because, in the first case, the solution converted into spray is diluted in strength by the steam which is used.

In cases of dryness of the mouth, tongue, and throat, water alone may be used, or water with the addition of one-tenth part of pure glycerin. *Alum* spray solution is a powerful astringent. Ten grains of *alum* to the ounce of water is a good proportion. The same quantity of *tannic acid* may also be tried. The spray solution of *carbolic acid* may contain two grains. Of *chloride of sodium*, that is common salt, from two to twenty grains or more to the ounce of water. *Chlorate of potash* five or fifteen grains to the ounce. *Nitrate of potash* solution may be used of the same strength. The spray solution of *nitrate of silver* should contain a grain to the ounce of distilled water. Messrs. Matthews, Carey Street, make excellent spray instruments.

You must be careful to filter the spray solution before you use it, as the fine tube of the spray producer is very easily

obstructed by any small solid particle, and is cleaned with difficulty. I find it a good plan to cover the end of the tube which dips into the solution with a piece of muslin, which may be tied round it. In this way solid particles are entirely prevented from entering the spray-tube at all. The spray instruments, the tubes of which are made of vulcanite, answer very well for ordinary purposes where five minutes' application two or three times a day is sufficient, but for more prolonged use a good steam apparatus is the best. I think, as time goes on, we shall find that the spray method is well adapted for the treatment of certain forms of skin disease, and many other cases in which it is not used at present. There is no difficulty whatever in the use of the spray producer, and the patient can be easily taught to use the apparatus himself.

Metallic and other Tastes in the Mouth.—Patients not unfrequently complain of very peculiar tastes in the mouth described as metallic, salt, acid, sweet, bitter, and even fecal (Fæx, dregs). The odorous matter of some putrid smells is certainly absorbed into the blood and afterwards exhaled, the smell and taste of the breath remaining for many hours after the individual has left the neighborhood of the odoriferous matter. In various derangements of the stomach the most peculiar tastes are experienced, compared with the flavor of rancid butter, valerian, vinegar, and many other things. Generally the symptoms complained of may be relieved by exciting the excreting organs. Purgatives, especially small doses of *Calomel* or *Gray Powder* (one to three grains) repeated every third or fourth night for a fortnight afford relief. *Exercise*, *Perspiration* in a warm bath, *Diuretics*, and *Sudorifics* are also useful.

Aphthæ, Thrush,—Sores and Ulcers of the Mouth.—Sores of the mucous membrane of the mouth are exceedingly common. These superficial sores are spoken of as

Aphthæ, from the Greek ἄπτω, I inflame. The derivation is not a very good one, for although no doubt the aphthous spots are associated with inflammation, they are not caused by this process. The meaning of this, like that of many other scientific terms, changes as our knowledge advances. They are little superficial ulcer-like depressions, sometimes with infiltration and consequent thickening of the tissues around, which occur upon the surface of the mucous membrane. Sometimes the epithelium only seems to be affected, but more often the sore extends deeper, and damages the structure of the mucous membrane itself. Aphthæ are extremely common in weak, ill-nourished infants, but are not unfrequently met with at all ages. In advanced age the disease occurs, especially in those who have suffered from prolonged exhausting maladies. In various forms of chronic phthisis, and some forms of pyæmia, they are present and cause great discomfort to the patient. It is difficult to explain precisely the changes which initiate the formation of aphthous sores, as, for example those which are so frequently formed on the side of the tongue, where the organ comes in contact with some tooth which is undergoing decay. The formation of a little painful ulcer is the result. Such ulcers very often affect the mucous membrane lining the lower lip just where the orifice of a labial gland is situated. Upon examination we find upon the aphthous spot a quantity of soft, moist material, which consists largely of epithelial *débris*, imbedded in and everywhere invaded by fungi, especially a form of *Oïdium albicans*, in various stages of development.

Now it has been supposed that the fungi are the cause of the aphthæ. The spores of the fungi, it is said, grow and multiply on the surface of the mucous membrane, and thereby cause inflammation and ulceration of the surface. Secretion takes place and the epithelium becomes soft and

spongy, and thus the growth and spread of the fungus is favored. The constituents of all organic secretions at the temperature of the body very soon undergo decomposition, and the germs being already present, fungi would soon develop, and would grow there and multiply. So that, instead of the fungi causing the disease, it is more probable that morbid changes on the surface of the mucous membrane give rise to changes favoring the development and growth of the vegetable organism, and that in these prior changes is to be discovered the true origin of the disease. Fungi and their spores are, as I have said, invariably present, and their mere presence cannot possibly account for the development of the obstinate little ulcers which are now and then found in persons who are in good health, though they trouble such only for a very short time. I say in health, but have no doubt I use the term wrongly, and though I cannot tell you the precise particulars in which the normal condition is departed from, the fact of the development of aphthæ is proof that the person affected is not in perfect health. The affection is not purely local, and it is most probable that the occurrence of the spots in the mouth is preceded by, and intimately connected with, an altered state of the blood.

These little aphthous ulcers are sometimes very difficult to get rid of, and of course a great number of *infallible* remedies have been discovered. Some of the most useful of these I will now refer to.

Treatment of Aphthæ.—Honey and Borax, the *Mel Boracis* of the Pharmacopœia, is a well-known remedy for aphthæ, and is equally efficacious in children, adults, and old people. Chlorate of potash also seems to exert some influence. In the case of adults the best remedies are those which are known to chemically change the fluids upon the surface of the spots which favor the development of fungi,

and upon which they live. *Tincture of Perchloride of Iron*, or the *Liquor Ferri Perchloridi* of the British Pharmacopœia, is a very potent local remedy. It may be applied to the surface of the ulcer with a camel-hair brush. Dip the brush into the *Tincture of Perchloride of Iron*, and just touch the surface of the ulcer; leave it for a moment or two, and then tell the patient to wash out his mouth with water. But it is better to mix the iron with glycerin. Equal parts of *pure glycerin* and *Tincture* or *Solution of Perchloride of Iron* make a very valuable application. This may be applied, as I have recommended, with a camel-hair brush, or one teaspoonful may be mixed with half a tumbler of water or more, and the mixture used frequently (every two or three hours) as a gargle or as a wash for the mouth. The patient should rinse the mouth with a little tepid water afterwards, for the frequent application of iron without due care causes temporary discoloration of the teeth. The glycerin assists the adhesive properties of the solution, and the morbid changes taking place are interfered with, the low vegetable organisms destroyed, and healthy action is soon re-established.

Another very useful local remedy is *Nitrate of Silver*. The stick of fused nitrate of silver is lightly applied to the spots, or a strong solution (10 grains to an ounce of distilled water) may be applied with a brush every day until the cure is effected.

The *Thrush* of infants usually yields to increased care in feeding. A very mild laxative is sometimes required, and oftentimes a little lime-water mixed with the milk is of great use. A little of the *Mel Boracis* may be put into the infant's mouth from time to time. My friend, the Professor of the Diseases of Women and Children, will give you better advice on these matters than I can do, and I must not trench further upon his department.

Offensive Breath.—I will now briefly refer to a derangement which occurs sometimes in connection with deranged gland action, and which gives people extreme annoyance. This is the emission of an extremely offensive odorous compound in the breath. It comes partly from the glands connected with the upper part of the respiratory and alimentary mucous membrane of the mouth and throat, and partly probably from the blood as it traverses the pulmonary capillaries. Even the individual himself is greatly annoyed by the smell which he exhales.

The odor is not by any means the same in all cases, though I cannot tell if chemical substances of different kinds are really formed. The odorous material is, I believe, however, formed in a great many cases by the glands of the mucous membrane of the air-passages of the throat and of the mouth. I think these glands secrete the material which ought to be removed in another form by excretory glands in other parts of the body, the action of which is much lessened or stopped in these cases.

As the offensive breath depends upon excretion of a peculiar organic matter from the system, in order to effectually get rid of the tendency you must try to render more active the process of secretion elsewhere, in order that the offensive material may be got rid of in some other way by another channel; in fact we must endeavor to get it or the material which yields it separated from the blood by other glands, particularly those which discharge their secretion into a more convenient emunctory. You will generally find that if you excite the action of the ordinary glands whose office it is to separate odoriferous compounds from the blood, and discharge them into the bowel, the disagreeable smell of the breath will soon cease. In short, if you can only excite the liver, the largest gland in the body, and the solitary and other excreting glands of the small and

large intestines to a little increased action, and keep up the action, the patient will cease to be pestered with the annoyance, which is sometimes so great that he is afraid to go into society or be much in the company of other people for fear of annoying them as much as he is himself annoyed by the smell and taste of the air he expires.

Acting upon this view, the first remedies to be tried in such cases will be purgatives, diuretics, sudorifics. In all cases antiseptic substances may be used to wash out the mouth frequently. *Charcoal powder* mixed with water; charcoal lozenges; a teaspoonful of *tincture of myrrh* in half a tumbler of water is a good wash for the mouth; *carbolic acid* will also be found useful. A weak solution of carbolic acid (one part to two hundred of water) may be taken internally, and the mouth may be rinsed out frequently with a stronger solution. Weak carbolic acid spray may also be tried (*see* page 61.) Condy's fluid is another useful remedy in such cases. The mouth may be washed out with a solution consisting of half a teaspoonful of the red Condy's fluid in a tumbler of water several times daily.

But if you are to afford any lasting relief, you must be particularly careful to regulate the patient's diet, for many of those who suffer from trouble of this kind are too fond of rich sapid substances, and perhaps beer or porter, and you will perhaps find upon inquiry that they habitually eat more than a not very vigorous stomach can properly digest. The excess of all the good things is perfectly oxidized, and is too considerable to be got rid of by the various glands whose business it is to remove it from the body. Certain compounds therefore remain in the blood, and instead of being removed by the bowels are eliminated in a crude form by the skin, by the glands of the mucous membrane, and partly by the lungs, and so the expired air becomes contaminated. It is most important that people who suffer

in this way should not over-eat, should not take more of anything than is required for nutrition. As a matter of fact, almost every one does eat more, and many very much more, than is required to keep the body in health. In some people, perhaps in consequence of the liver being less active than it should be, instead of the excess of food being excreted in an altered form in the usual way by the solitary and other glands of the bowels, exceptional chemical changes take place, and odoriferous compounds are formed to the patient's great distress. As I have suggested, the way to remove this great annoyance is to encourage the more free action of the glands whose ordinary office it is to separate this class of substances from the organism. Try and transfer the action from the surface of the gastric and respiratory mucous membrane to that of the large bowels.

For persons who have long suffered you must find out some mild harmless purgative, and of this frequent doses must be taken. You must in fact take care that the bowels act freely, and that the excreting glands do their work properly.

Almost any purgative will have a good effect in some cases: *Colocynth*, *Aloes*, *Podophyllin*, *Scammony*, *Rhubarb*, *Jalap*, *Senna*, have all been prescribed with benefit, and in many different forms. Several other purgatives have been recommended by different authorities. As a general rule it is better not to give large doses, as you require not only to excite the action of the intestinal glands, but to keep it up—to help the glands from day to day to do their work—to give them just a little artificial stimulus and no more. From three to four grains of the *Pilula Colocynthidis et Hyoscyami*, or the same amount of *Pilula Rhei Composita*, or you may add half a grain or less of the *Extractum Aloes Barbadensis*, or one-fifth or less of a grain of *Podophyllin* to half the quantity of either of the pills mentioned. At first the pill should be taken every night, or just before dinner;

and when it begins to act, every other day, or once in every three or four days—the object being to so regulate the bowels as to cause a daily action. With some persons *Scammony* acts admirably. One or two grains of Resin of Scammony, *Scammoniæ Resina*, may be added to two or three of the *Compound Colocynth Pill*, which as you know contains a certain proportion. A patient who died at the age of ninety-five had taken scammony two or three times a week for many years with the greatest benefit; but neither this nor podophyllin, nor any purgative that I know of, acts equally well upon all. You must be well acquainted with a great number, and must be able to combine purgatives in many ways, and then you will often be able to hit upon the right thing for a particular patient. Our predecessors were more skilled in suggesting combinations of remedies than we are. There is not the smallest doubt that you may often succeed with combinations when you quite fail to effect your object with single substances.

Use of Mercury.—Although I must not tire you with mentioning a multitude of remedies for a condition which sometimes resists all our efforts to relieve, there is yet one remedy which is of the greatest service if given with judgment and due care. This is mercury, which, as you know, has the credit, and deservedly, of acting specially on the liver, but which also causes increased action of most of the glands connected with the alimentary, and probably the absorbent, system. Mercury is one of the remedies upon which our forefathers relied more implicitly than we do. I think they often gave it too frequently and in unnecessarily large doses, but now I think we err in an opposite direction, and some practitioners not only do not prescribe mercury in cases where immediate relief would follow its administration, but refuse to prescribe it altogether, and encourage the prejudice needlessly excited in the minds of

many people against it. Many a mother, who is now shocked at the very name of calomel, is nevertheless frequently giving it to her darlings in some patent powder which she has used for years, and which she will tell you is a most excellent remedy for every complaint of infancy and childhood.

Now in many instances in which the patient suffers from offensive breath, with a dirty tongue and a disagreeable taste in the mouth, and defective secretion of saliva, with possibly slight nausea, and fulness or discomfort about the pit of the stomach, you may often effect a cure and earn the gratitude of your patient by prescribing a few small doses of blue pill, gray powder, or calomel. The medicine should be given with a little rhubarb, compound colocynth pill, or some other purgative, every third or fourth night, three or four doses in all being ordered, though often one or two only will be required. With some persons, however, no compound of mercury will agree, and in these very exceptional cases you must employ other purgatives, and give various salines to act on the bowels, the liver, and kidneys, especially the *Nitrate of Potash, Potassæ Nitras*, and the *Chloride of Ammonium, Ammonii Chloridum;* five to ten grains of the first, and twenty grains of the last, dissolved in two or three ounces of water, on rising and on going to bed.

Impaired Appetite, Loss of Appetite.—Next let me say a few words about loss of appetite, a grievous complaint of many people who will tell you with dismay and astonishment that they have ceased to enjoy their food. They never feel hungry, and never eat with appetite.

Sometimes this lack of inclination for food is due to the circumstance that the complainants ordinarily eat too frequently, and perhaps also eat too much. There is, however, unquestionably a form of loss of appetite, or impaired appe-

tite, concerning which you will be from time to time consulted. This ailment is learnedly known as *Anorexia*, the scientific term for loss of appetite. The word is derived from the Greek, *a*, priv., ὄρεξις, "appetite."

Loss of appetite in some cases is rather desirable and conservative. Many a man who boasts of always enjoying an excellent appetite, would be more fortunate if he lost it for a time. It is in truth a misfortune to have too good an appetite unless you have great self-command; for the temptation to satisfy it is great, particularly in the case of those who are well off, and are obliged to keep good cooks. Many such persons are doomed to suffer as they get older from having eaten too much at an earlier period of life. He who wants to keep himself in a state of health must not only sit down to his meals with an appetite, but will take care that he finishes before he is satisfied.

Loss of appetite very frequently depends upon a state of the mucous membrane of the stomach approaching to inflammation. After chronic inflammation has existed for a considerable time, degeneration of the glands and other tissues takes place, and just as occurs sometimes in old age, and after prolonged exhausting diseases, digestion becomes permanently weak, and in many cases there is loss of appetite. It is necessary to help digestion artificially, as I shall explain more fully in another lecture. But in persons whose stomach is fairly healthy, you will observe that anything which induces a state of the system in which the nerves become weak, great fatigue, over much brain-work, anxiety, mental emotions, fear, or joy, may give rise to impaired appetite.

In cases in which the loss of appetite depends merely upon some temporary derangement of the mucous membrane of the stomach, many of the remedies useful in weak digestion will afford relief. (*See* page 111.) Very often you

will find a change of diet for a few days will effect a cure. Advise the patient to take nothing but milk and beef tea, with a little stale bread, corn flour or lentil flour properly cooked. But where the loss of appetite depends upon undue wear and tear of the nervous system and is associated with mental depression, general weakness, inability to exert body or mind, a thorough change is required—a complete alteration in the general habits of life, an abandonment for a time of the general daily routine whatever it may be. Some of the cases in which the appetite becomes gradually reduced, or completely lost, are very curious and difficult to relieve. They occur commonly in the so-called hysterical *diathesis* (disposition, constitution, from δια and τιθημι, I place, I dispose). In many instances there certainly is no structural alteration either in the stomach or in any part of the nervous system. The affection is no doubt due to some deranged nerve action which lasts for a time and then passes off without leaving any actual lesion. Hysterical (ὑστέρα, the uterus, because the condition is often associated with uterine derangement) girls are very apt to lose their appetite for a time. At first having little desire to eat they yield to the impulse and gradually bring themselves to refuse all ordinary food. If pampered and pitied and regarded as interesting objects, they become worse and glory in objecting to eat. Occasionally we do meet with cases of people in a state almost of starvation in consequence of having given way to this feeling of want of appetite. From there being no desire for food there is soon acquired an actual distaste, dislike, aversion. People often tell us that the mere smell of food at once causes all desire to disappear. There may be danger of actual starvation if the patient is not managed with judgment, but in such cases, when a fatal result occurs, death more commonly depends, not upon actual inanition, but upon the development of some inter-

current malady when the body is in an excessively weak and exhausted state.

Some of those remarkable "fasting" celebrities have commenced by degrees as above suggested. The fasting tendency has developed itself after loss of appetite, occasioned by a weak state of the digestive process, due to imperfect action of the secreting glands of the mucous membrane of the stomach, or of the nerves which excite these glands to form and discharge their secretion, has existed for some time. Fasting becomes quite a passion. The patients are pitied and patronized by the people about them, who humor them in every conceivable way, and encourage them in the belief that they are peculiar people, who, unlike common folk, can actually live without eating. This leads to deception. They systematically refuse anything that is brought to them, and are soon looked upon as mysterious persons. In fact, they surreptitiously obtain a little, and in this way may live in a weak, emaciated state for a great length of time. They lose weight very slowly, and then become stationary, which fact of itself is proof that nourishment is somehow introduced into the body.

An excellent account of one of the most remarkable of these cases, together with much matter of importance in connection with the general subject of starvation, has been published by my friend Dr. Fowler, who investigated the evidence in the most thorough manner. I strongly recommend all who are interested in the physiological, moral, and legal aspects of the case to study *A Complete History of the Case of the Welsh Fasting Girl* (*Sarah Jacob*), *with Comments thereon; and Observations on Death from Starvation*, by Robert Fowler, M.D., Renshaw, 356 Strand, 1871.

Voracious Appetite.—Occasionally we are consulted about an inordinate appetite. The patient is never satisfied.

He eats a pound of beefsteak or more, and still feels hungry. In some persons this great desire for food can hardly be considered as a disease or even an ailment. Children occasionally suffer. No doubt the state is often induced by injudicious management.

Remarkable voracity, is, however, not uncommonly associated with morbid states. In certain forms of mental disease it is a prominent symptom, and in *Diabetes*, δια, through, and βαίνω, I pass), a condition characterized by the formation and elimination of an enormous quantity of sugar from the system, the appetite is very frequently, but by no means constantly, enormous. Many a diabetic can consume one pound, or even two pounds, of rump steak at a sitting, and, what is more remarkable, thoroughly digest it. Children and adults who suffer from worms have often a very large appetite, and it will be well for you to bear in mind this circumstance. Get rid of the worms and the child eats moderately again.

Inordinate appetite is spoken of as Bulimia. This word is, like many others I have referred to, derived from the Greek. You must have been struck with the great number of medical terms, and particularly names of diseases, which are Greek. Those among you who have been taught Greek at school enjoy an advantage over those who are ignorant of it, inasmuch as the meaning of a vast number of Greek words will be at once apparent. It is somewhat unfortunate for all who are going into the profession that for some time past there should have been a dead set against Greek. The word *Bulimia* comes from βοῦς, an ox, or βοῦ, the augmentative particle, and λιμός, hunger. Bulimia, or voracious appetite, is a condition which I suppose may be due to a very irritable state of the nerves of the stomach. Not unfrequently the affection is associated with vomiting, the

stomach rejecting its contents as soon as they have accumulated up to a certain point.

The voracious appetite, as we see it existing in children and young people, usually comes from undue encouragement. The greater the desire for food the more food the individual eats, and so he goes on until he succeeds in consuming several times as much food as his system requires, and is thus thrown upon important organs the task of eliminating a quantity of useless material which ought not to have been taken. Sad mistakes are frequently made by parents in this matter. A child perhaps is rather thin, and therefore encouraged to stuff, and by degrees the habit of taking enormous quantities of food is acquired, with the not uncommon result of getting thinner, instead of gaining in weight.

Many of the railway navigators, and very strong laborers who have heavy work to perform, suffer from this affection, in consequence partly of yielding to desires which their high wages enable them to gratify, and partly because they act upon the generally received theory propounded by some popular philosophers, that the more you consume in the way of food the more work will your machinery perform—a principle which, if correct as regards machines, is certainly untrue when applied to living organisms, and devoid of all foundation as regards man. The railway navigators are fine, strong men, from 5 feet 10 inches to 6 feet high, and some of them certainly do consume an enormous amount of animat food, probably three times as much as is required for the performance of their work, and very much more than would be a most liberal allowance for them. The excess, of course, must be somehow excreted, and before it can be excreted must be acted upon by the secretions of various organs, especially the liver. This and many other glands in the body are thus called upon to do an ex-

cess of work, and, as a general rule, they get damaged by overaction before the man reaches the age of forty, and in not a few cases completely break down from overwork, passing into states of disease which soon destroy life. Indeed, we seldom see one of these men as old as forty. The great majority break down before that age is attained. The navvy has unquestionably to work very hard indeed. His wages depend upon the weight he can lift and the rapidity with which he can move heavy weights, so that he is encouraged to exert himself to the utmost. The more work he can do in the time, the more he earns. Like the popular philosopher, he adopts the absurd theory that the more he eats the more work he will be able to do, and unfortunately acts upon it, squandering his money in beef and beer that strain his organs of digestion, assimilation, and secretion, and ruin his health. There is no one to teach him better, so he adopts the prejudices of his order and follows his own inclinations.

If these men exercised common sense, and consumed about one-fourth of the food and beer many of them indulge in, they would have a chance of living to the ordinary period of life; and if they did not do quite so much work in the time, they would work for many years longer. Many men who belong to the middle and upper working classes, and who have lived moderately, are often very strong and vigorous, and able to undertake a considerable amount of bodily fatigue at the age of sixty-five or seventy, and there are many hard workers who have passed the last age.

It need scarcely be said that, as regards the treatment of these cases of inordinate appetite, it is a matter of the first importance to carefully regulate the diet. Small doses (three to five minims) of hydrocyanic or Prussic Acid, *Acidum Hydrocyanicum dilutum*, and fifteen or twenty grains of carbonate of soda in an ounce of water, half an hour before

meals, is often useful. Liquor Potassæ, Bismuth, Tincture of Hop, Tincture of Henbane, preparations of Opium given with caution in small doses, and several other medicines may be prescribed to allay the feeling of hunger in cases in which it depends upon undue irritability of the nerves of the stomach.

Nausea.—Some persons suffer frequently from nausea, and a most unpleasant sensation it is to experience. You must, however, take care to distinguish between *nausea* and vomiting—actual sickness. People often tell you they always feel sick, although they never reject the contents of the stomach. This feeling of nausea is a very common one, and is met with in various degrees; sometimes being very slight, just a little qualmishness, which as often as not goes off soon after food is taken; sometimes so severe that the patient feels as if he must vomit; and this sensation comes on as soon as he wakes, and lasts perhaps for some hours, and possibly may not entirely disappear for many days at a time. Nausea prevents people from eating, or at any rate makes them careless whether they eat or not, and entirely takes away what some people highly appreciate, the enjoyment of tasting, biting, and swallowing food. There are persons who, instead of always having a good appetite, hardly know what it is to feel hungry. They eat as a duty, but would quite as soon go without food. The feeling of being moderately hungry, looking forward to and desiring food, is a pleasant sensation, especially if there is a prospect of its being gratified within a reasonable time.

Nausea may be brought on by very many circumstances. If you were to take but a 1-4th or even the 1-6th of a grain of *Tartar Emetic*, *Antimonium Tartaratum*, a drug in much vogue fifty years ago, but now seldom prescribed, you would soon discover what the feeling of nausea is like, if you had not already experienced nausea otherwise caused. Those

who go a short journey by sea often suffer from nausea, or worse than that. The very few among you who have never learned to smoke may easily study the phenomena of nausea, and will in future remember what is meant by the term if you smoke a portion of a cigar for the first time. If the feeling should be so unpleasant as to make you determine not to repeat the experiment, perhaps, upon the whole, so much the better, for smoking wastes a great deal of time which might be better employed.

Slight nausea is no doubt dependent in the ordinary way upon a slightly disturbed state of the mucous membrane of the stomach or a deranged condition of the liver, or upon both. The sensation may be relieved in many ways. Pepper and various pungent substances, which excite the secretion of the stomach, are often useful. Cayenne pepper and Curry powder, are well-known remedies. But nausea seems to be due in many cases to some slightly impeded circulation in the vessels of the mucous membrane of the stomach, and in those of the liver. The latter gland is sometimes enlarged in consequence of the blood that accumulates in it. After a few days, especially if the patient rest, it regains its usual volume without having undergone any permanent alteration, and without being in any way damaged. Nausea, dependent upon temporary vascular congestion, may be removed by promoting a more free flow of blood through the vessels of these organs. A warm bath, or a Turkish bath, will very often effect a cure, particularly in those whose habits are too sedentary. Plenty of fresh air, and but little food for a day or two, will sometimes alone cause the discomfort to cease. If these means fail, a mercurial purgative should be tried, *see* p. 70.

Many healthy persons who suffer from time to time from nausea depending upon oversensitiveness of the stomach, liver, and other glands, discover not only how to cure them-

selves in a very simple way, but also how to keep themselves well. They find it necessary to give their stomachs rest for from twelve to twenty-four hours, and then they get well. The prejudice that exists against going without one's dinner now and then, is really most absurd. An occasional fast is almost necessary for those who live even moderately well, and many, especially ladies who are little out of doors, and take little exercise, would be in much better health and would feel better if they would not dine quite every day and take a good lunch as well. It is also a good plan to take fish and no meat twice a week. People who suffer from nausea or biliousness and want of appetite, and there are not a few who are habitually ailing in this way, who seldom indeed during a long life have felt really well, often find out for themselves, or they are told by too officious friends, that a little alcohol just before a meal will afford relief. Brandy, gin, bitters of various forms, pick-me-ups, etc., are taken for this purpose, and a worse system has never been carried out. That bad habit of taking now and then ginger brandy, cherry brandy, or the worse one of frequently imbibing strong sherry for relieving nausea, a sensation of hollowness, or faintness, or fulness, or all-overishness, or what not, has been the ruin of thousands. Once in the habit of adopting this vicious practice, many find it a far more difficult matter to give it up than you would suppose.

Bad indeed is the fashion of taking just before dinner a small dose of brandy, or ginger brandy, or dry sherry, or some other alcoholic stimulant of this kind, just to excite the appetite in order that justice may be done to the repast, that is, that people may swallow more than is good for them, and more than they can easily digest. If a man cannot eat his dinner without first swallowing a stimulant, he had better go without it. He might wait a few hours, and

then he would probably be able to take simple food without condiments or stimulants.

As a matter of fact the habit of taking alcohol too frequently and too regularly often comes from this most objectionable practice of taking a little stimulant before dinner. The "life of a party" cannot, of course, help himself, for it is his duty to be sprightly and entertaining from the first. Doctors are often accused of teaching and encouraging people to "tipple," because in certain morbid conditions they find that it is necessary to prescribe stimulating doses of alcohol. For one person, however, recommended to take alcohol by us, how many thousands who have never consulted a doctor in their lives, take it on other grounds,—simply because they like it, and see others take it, or because they like the sensation it produces? Many will admit that they began because they suffered from a "sinking sensation," or nausea, or uneasiness about the stomach which troubled them from time to time, and could be invariably relieved by a little brandy. The little brandy gradually increases, and nausea and other unpleasant sensations instead of occurring once or twice in the day, occur a great many times, and the victim will tell you that he is obliged to resort to the remedy in order to do his work. Of those who act thus many become slaves to alcohol, and then a more deplorable phase is reached. They are no longer able to abstain, all self-command is lost, and they fail to be able to control themselves in any way, while they will not submit to be influenced by others. This state lasts for a time, and then a new and very remarkable phenomenon is sometimes developed. They abstain entirely, and hate alcohol even more than they loved it before. They despise themselves, are overwhelmed with remorse, and in a little time they give up the *rôle* of sinner and adopt that of saint, and saint of the most arbitrary and uncompromising kind. For a

long time they were quite unable to govern themselves, but now they are determined to govern others, and in a very decided manner. They express virtuous indignation against all who take or sell or produce alcohol, and think it very hard that they are not able to punish every one who prefers wine to water, and who dares even to look at a stimulant. We have the curious spectacle of a minority who, by their own confession, for some time could not keep themselves within the bounds of reason, now seeking to impose their arbitrary veto upon the very large majority who have never had the slightest difficulty in either taking a little, much, or abstaining altogether, as seemed to be the best for their organisms at the time. With as much reason might power be given to convalescent lunatics to put all the sane people in strait waistcoats, or confine them in padded rooms. These unfortunate people who cannot taste a certain fluid without making themselves worse than animals, will sometimes crave advice. You may be of some use to them by ordering certain medicines which will act like alcohol, but which are not open to the objections pertaining to that substance. A little ammonia will often be of use. You may order a teaspoonful of Sal volatile, *Spiritus Ammoniæ Aromaticus*, with twice as much Compound Tincture of Cardamoms, *Tinctura Cardamomi Composita*, in a wineglassful of water every three or four hours for a few days or a week. Tincture of Hop, *Tinctura Lupuli*, Tincture of Orange, *Tinctura Aurantii*, or Syrup of Orange, *Syrupi Aurantii*, are good additions to improve the flavor of the dose.

As regards medicines for the relief of nausea you will find that from one to three or four drops of *Hydrocyanic Acid*, *Acidum Hydrocyanicum dilutum*, in two tablespoonfuls of water, or in a little Soda or Potash water before food, will be a useful prescription. In some cases three or four drops of *Ammonia*, *Liquor Ammoniæ*, in a wineglassful

of water when the feeling of nausea is most troublesome, may cure the ailment. A small dose of blue pill or calomel will sometimes cure very obstinate nausea, although many other remedies have failed. In not a few instances counter-irritation is of use. A mustard poultice may be applied over the region of the stomach and liver for twenty minutes every third or fourth day. Or a wet rag, covered with oiled silk, or a piece of Spongio-piline, wetted with warm water, and worn for an hour or two, will frequently be found very efficacious. See also the treatment of Indigestion, p. 98.

Thirst.—It is probable that thirst is less dependent on the state of the stomach than is the feeling of hunger, though it is quite true that thirst may be excited by Cayenne pepper, and irritating matter introduced into the stomach, often occurs in connection with certain forms of indigestion, and is almost always present an hour or two after a good meal, which is defective in fluid. The fact is that thirst is relieved by injecting fluid into the blood and by the absorption of fluid from the general surface; that it is present in all febrile states, comes on after diarrhœa, after the action of ordinary purgatives, and after free perspiration, however excited, would seem to indicate that the feeling is somehow due to the reduction of water in the blood. The sensation is experienced principally in the back of the mouth and fauces, and considering this part of the mucous membrane very readily gets dry even in health, it is probable that the very abundant distribution of very fine nerve-fibres, close to the capillary network of wide capillaries with an unusual number of bioplasts, are afferent fibres, and take part in the initiation of the phenomena which constitute what we know as thirst. The capillaries and nerve-fibres referred to in that part of the mucous membrane which covers the convex surface of the epiglottis, and which is admirably situated for

the detection and registration of varying degrees of moisture of the mucous membrane, are represented in pl. XCIII of *How to Work with the Microscope*, 5th edition.

No rigid rules can be laid down as to the exact quantity of fluid that should be taken per diem, for the proper amount varies in individual cases. It should undoubtedly bear a certain relation to the solids taken, but in practice it is impossible to say precisely what the relation should be. One man finds he digests better and feels better if he takes from two to three pints of fluid daily. Another taking about the same amount of solid food or more, finds that half as much fluid suits him best. You will find when in practice, that some are obviously taking too much to drink, and many too little. You will meet with cases of greatly impaired digestion, general weakness, and feeble health, evidently due to the habitual introduction of too much liquid, the patients always feeling thirsty; and on the other hand, not a few persons complaining of muscular and nerve pains in various parts of the body, who are evidently suffering from a tendency to gouty and rheumatic affections, may be completely cured by a course of water,—in fact, by washing out the tissues thoroughly every now and then.

INDIGESTION; ITS NATURE AND TREATMENT.

Indigestion—Dyspepsia.—Many lectures might be devoted to the subject of dyspepsia, but I shall only be able to give you an imperfect outline with a few suggestions concerning points of treatment which seem to me of great importance. Digestion, when it occurs naturally, goes on without the slightest disturbance. Indeed we are not aware of what is taking place. Those of you who are in perfect health probably do not know from any feelings you experience, that you possess such an organ as a stomach with

five and twenty feet or more of small intestines beyond it. Probably many come here to study medicine without having the least idea what a stomach is like until they see one in the dissecting-room.

Some unfortunate persons, without being actually ill, hardly swallow anything without soon afterwards being made painfully conscious of the existence of a stomach and its exact whereabouts. They cannot define its precise limits, but they very frequently suffer from uneasiness or actual pain which is referred to the neighborhood of the "pit of the stomach" and some distance beneath the surface of the skin. This discomfort usually comes on after taking food, but in certain forms of indigestion the pain precedes the introduction of solids or fluids, and when this is the case the pain is frequently relieved by food. When pain or uneasiness comes on some time after food has been taken, it may continue as long as the process of digestion lasts, but when it is completed or nearly completed, the pain subsides, and does not return until after the next meal has been taken. Indigestion is learnedly spoken of as dyspepsia, whch comes from two Greek words, δὺς, with difficulty, and πέπτειν, to concoct, or digest.

The pain or discomfort consequent upon slow or imperfect digestion, or indigestion, may be induced by many different circumstances. There may be some deranged action of the mucous membrane of the stomach, and hypersensitiveness (ὑπέρ, over or above), or severe pain may be occasioned by an altered state of the circulation directly or indirectly (by reflected action) influencing the nerves of the stomach. Very many times one comes across cases of what may be called ordinary indigestion, where there is no actual disease, but still where a troublesome and almost constant fixed pain, aching, heaviness, or sense of weight or fulness, or pressure is complained of, which is very

wearying to the patient and frequently deters him from taking food. In consequence he gets thin and pale, and perhaps loses heart and becomes very weak and despondent, and much out of health.

If we could see the mucous membrane in some of these cases of indigestion we should no doubt find it unduly vascular. There would be a state approaching to inflammation over a limited area only, possibly over a portion of mucous membrane not larger than a sixpence. Here the vessels would be seen distended with blood moving very slowly along the capillary tubes, and some exudation from the vessels would very likely be found in the surrounding tissue. The nerves distributed to the mucous membrane would have undergone those changes which result in their being unduly excitable. Their bioplasts and those of all the tissues would be found enlarged. Partly from this last circumstance, and partly from the pressure upon them exerted by the undue distension of the vessels, the sensitive nerve-fibres would be painful. In this way probably the pain from which the patient suffers is caused. The state of the mucous membrane I have just referred to may soon give place to the normal condition, or it may persist and lead on to a state of things which results in the formation of an ulcer, the nature and symptoms of which I shall have to refer to in another part of my course.

Of the Arrangement of the Finest Nerve-Fibres in the Stomach and Intestines.—The whole question of pain is one of the greatest interest and importance, and as the pain in indigestion and other derangements of the digestive organs affects nerves which in the normal state transmit impressions only of which we are not cognizant, it will be worth while to consider the arrangement of the nerve-fibres concerned, and discuss their probable action. Disorders of the intestinal canal cannot be understood, in the

absence of the knowledge of the way in which healthy action is governed and carried out. Although the bowels in every part are very freely supplied with nerve-fibres, so long as the functions are properly discharged we remain quite unconscious of the existence of exquisitely sensitive tissues in connection with the alimentary canal. Fortunate are all who pass through life without discovering that sensitive nerves are distributed to the intestines, and experiencing the consequences of deranged action. We know nothing of the changes taking place in the stomach and bowels until something interferes with their due performance. Then indeed we become aware of the contrast between ease and certain forms of dis-ease as it affects these wonderful structures.

The whole of the intestinal tissues are most abundantly supplied with nerves. You will find in some of the older anatomical books, descriptions given which would give you a very imperfect notion either of the number or arrangement of the nerve-fibres. In fact the most important and most extensive portion of these nerve-fibres is known to few anatomists even now,—but not very many years ago it would have been impossible for us to form a conception of the true arrangement of the nerve-fibres of the digestive system, or of the actual phenomena going on during life in any part of it.

All the tissues entering into the formation of every part of the intestinal canal are most abundantly supplied with very fine nerve-fibres, although you might read much that would lead you to infer that the mucous membrane and muscular coat of the stomach and intestines received very few nerves. It used to be supposed that the contraction of the muscular tissue resulted from direct irritation or stimulation. And even now little attention is given to the highly important part played by the nerves and nerve-

centres which influence every action and every movement connected with every part of the digestive process.

The nerves are extremely numerous in all the important tissues which make up the thickness of the intestinal canal. Indeed in every part of the digestive apparatus from the mouth to the anus, the secreting and absorbing, as well as the muscular apparatus, receive an abundant supply of nerve-fibres.

The muscular fibres which are distributed around the stomach and intestine as well as those situated just beneath the mucous membrane are frequently though not constantly in active movement, each fibre alternately shortening and lengthening,—undergoing contraction and relaxation,—actions which occur at different times in different parts of the alimentary canal, and in all alternate probably with comparatively long periods of rest or quiescence. But invariably the contraction of the muscular tissue, like that of every form of voluntary and involuntary muscle, takes place under the influence of the nerves.

Besides the nerves distributed in networks and plexuses to the mucous membrane and muscles in great number, there is a highly complex system of ganglia or nerve-centres little appreciated and indeed hardly known to more than a few observers.

You all know, of course, what multitudes of ganglia help to constitute the sympathetic system. Many of the large ones you see in the course of your work in the dissecting room, and the more skilfully you dissect the more ganglia you will find. You are also well aware of the complex interlacement of coarse nerve-fibres and trunks in many parts of the abdominal sympathetic system, but from the most perfect ordinary dissection that can be made, you will form but a very imperfect idea of the vast number of minute

ganglia and ganglion cells connected with what seem to be fine nerve threads.

If, now, from a piece of small intestine pinned out upon a strip of wood or cork, you will detach carefully the mucous membrane from the muscular coat, and soak the first for a few days in equal parts of glycerin and water, replacing the solution from time to time with fresh fluid, and then gradually add stronger glycerin, you will find the tissue will assume a state favorable for the demonstration of the ganglia. Small pieces of the submucous tissue are to be snipped off, placed on a glass slide, and after being gently teased out with pins or needle points, and moistened with fresh glycerin, covered with thin glass. If you examine such a specimen under an inch object-glass, you will have no difficulty in demonstrating a vast network of ganglia and nerve-fibres. You will observe hundreds of little microscopic ganglia on different planes, and these you will discover are all connected with one another by numerous intercommunicating bundles of nerve-fibres constituting quite a network or plexus of fibres and ganglia. The ganglia in question were discovered some years ago by Meissner, and Auerbach had some years previously described plexuses and ganglia close to the muscular coat. But of course these observations were contradicted by some and ignored by others, and long papers were written by great authorities to prove that the nerves, ganglia, and plexuses were really vessels, the points of divergence of which had been mistaken for ganglia. There is, however, no difficulty in demonstrating these ganglia most conclusively. I used to show, in connection with the course of physiological anatomy which I used to give in this college, the cells composing them, with the bioplasm of the nerve-cells and fibres artificially stained with carmine, and I can assure you, with the greatest confidence, that the cells are true nerve-cells,

and that fine nerve-fibres pass from them to supply the tissues of the mucous membrane with nerve-fibres, as well as the thick layers of muscular tissue which encircle the intestinal canal. So numerous are the fine nerve-fibres that there is not a portion of tissue the one five-hundredth of an inch in width which does not receive an abundant supply.

Every villus of the intestinal canal is supplied with nerve-fibres, and the action of each of its several component tissues is presided over by nerve-cells. Every gastric gland as well as every intestinal follicle is also abundantly supplied. In structural connection with the nerve-fibres is a nerve-centre, or rather a group of ganglia which regulates their action, governs the changes which result in the secretion of gastric juice and intestinal fluid, and harmonizes actions emanating from other centres, or groups. The nerves have also much to do with the simultaneous discharge of the secretion from thousands of microscopic glands upon the surface of the mucous membrane.

But in spite of this marvellous nerve supply, as long as things go on rightly, you are not cognizant of any of the changes which are taking place. The intestinal tube is sometimes firm and distended, sometimes relaxed and contracted, and yet all these alterations in volume, all this distension and contraction, take place for the most part without our knowing anything about it.

But if the same phenomena occur in an exaggerated way, or if anything interferes with their due performance, we immediately become conscious that things are not as they should be. We cannot always say exactly what part of the intestine is in fault, or what sets of ganglia are disturbed in action, but we experience discomfort if not actual pain, and almost instinctively we so act as to give the whole digestive system little to do. We allow it to rest for a time. We take no food or confine ourselves to easily digested

slops, and in the course of a short time things generally right themselves.

But surely it is very remarkable, seeing how unconscious we are in health, at least as far as feeling is concerned, of the existence of the intestinal canal, that when its action is much deranged, the pain experienced should be so very severe, and so difficult to bear, as is the particular pain which is developed at the peripheral distribution of the sympathetic nerve-fibres, whose ordinary actions go on quietly and almost incessantly, but quite unconsciously. The most acute pain, I believe, that an individual can suffer, is pain in which these very nerve-fibres are involved—pain dependent upon inflammation of the internal or external surface of the intestinal canal.

The peritoneum (*περί*, around, and *τείνω*, to extend) or thin membrane external to the muscular coat of the intestine, which is supplied with nerves from these same ganglia, and which in the healthy state is always sliding smoothly in contact with the moistened surface of another layer of the same delicate tissue, becomes exquisitely sensitive in inflammation. The pain of *peritonitis* (*περί*, *τείνω*, to extend, and *ιτης*, rash, the suffix *itis* denoting inflammation), is one of the most terrible forms of pain that any human being can have to bear, and yet these same nerve-fibres which are concerned in the causation of most horrible suffering, act as a general rule quite unconsciously, do their work without our knowing anything of them, or of the apparatus they govern.

No wonder, then, that the nerves concerned in the action of the stomach, being arranged according to the same principle as those in the intestines, and being in fact part of the same system, pain is experienced if anything goes wrong in this organ.

Pain-conducting Nerve-fibres.—The nerve-fibres con-

cerned in the transmission of the sensation we call pain, are not, I think, those which have been regarded as special sensitive nerves, but the fine fibres which I was the first to demonstrate close to the capillary vessels, and so situated that any change in vascular turgescence would affect them. As is well known the pain of a bad sore throat is much less severe than the pain experienced in pleurisy, pericarditis, or peritonitis, and yet the number of nerve-fibres distributed over a given area of tissue is many times as great in the case of the mucous membrane than in the serous membranes. When the tonsil is inflamed the pain is very great, but it depends less upon the tension of the mucous membrane covering it than upon stretching of the vessels and nerve-fibres in its substance. The pain we suffer from in rheumatism again originates in tissues which are rich neither in nerves nor vessels, and yet it is more severe than many forms of pain, the seat of origin of which is in parts more highly vascular. The pain in the lungs when pulmonary capillaries are congested, even if they be seriously damaged, is slight as compared with that produced when the capillaries of the pleura are involved. Nerve-fibres are not only distributed close to the capillaries but in many tissues, as for instance the cornea, are situated at some distance from them; but these nerve-fibres belong to the same order and act as afferent nerves to centres, the efferent nerves of which are distributed to the muscular fibres of the little arteries. When these afferent fibres are made to act violently, *pain* I believe is experienced.

The pain, associated with circumscribed inflammation of various kinds, is due partly to the stretching and pressure upon the fibres of these nerves, and partly to the increased nutrition which proceeds in the nerve bioplasts, in consequence of the increased amount of nutrient pabulum which

bathes them, and which has transuded through the vascular wall.

Gastrodynia.—If the vessels of even a small part of the mucous membrane become unduly distended from any cause, discomfort results. If there is too much action of the glands or insufficient action, pain in the stomach, learnedly called *Gastrodynia* (*γαστήρ*, the stomach, and *ὀδύνη*, pain), or *Gastralgia* (*ἄλγος*, pain), is occasioned.

If we take food which does not digest, that is, if it does not gradually dissolve as it should do, but remains in the stomach, being moved round and round by the muscular action of the organ, we experience pain—and sometimes extreme pain. If you take an injudicious meal and drink a quantity of bad champagne, more especially if your dinner comprises a considerable quantity of tough beef and concludes with a good supply of heavy pudding or pastry, unless you happen to have an unusually vigorous digestion, you will probably learn what is meant by an attack of *gastrodynia*. You will at the same time be thoroughly convinced of the existence of a vast number of extremely sensitive nerves in connection with the walls of your stomach. Not only so, but in all probability the action of the whole intestinal canal will be violently disturbed, and you will be fortunate if you get a sharp attack of vomiting and active diarrhœa; for in this way you may perhaps take a short cut to returning health. But thousands who eat moderately, and some even who eat immoderately, go on from year to year without the slightest discomfort of any kind in any part of the intestinal canal.

Indigestion may be due to altered gastric juice, or to the secretion being too acid or not sufficiently acid; or the dissolving substance, the pepsin, may be in insufficient quantity or imperfectly formed; or, on the other hand, the derangement may depend upon the pouring into the stomach of a

considerable quantity of alkaline fluid, which probably neutralizes the action of the gastric juice, and in other ways impedes digestion and interferes with the changes taking place in the stomach. Strange to say, two fluids of opposite qualities are secreted by the glands in different parts of the stomach.

Heartburn, Pyrosis, or Waterbrash.—There are certain glands at the cardiac extremity, near the point where the œsophagus opens into the stomach, and called by some the cardiac glands, which secrete an alkaline fluid. It seems that these glands in certain cases secrete a great quantity of a clear somewhat viscid fluid having a distinctly alkaline reaction. Few of us are aware of the existence of the secretion of these cardiac glands in our own organisms, nor have we any actual experience of the formation of a fluid of an alkaline action. As is well known the contents of the stomach, under ordinary circumstances, are extremely acid, and many suffer from the regurgitation from time to time of a small quantity of highly acid fluid into the pharynx, when its distinctly acid taste is experienced. Chalk or magnesia is taken for the relief of the *Heartburn*—formerly, when physicians thought very much of hard words, termed Ardor Ventriculi, Cardialgia (*καρδία*, *ἄλγος*, pain). The acid fluid will effervesce freely if bicarbonate of potash or soda be added to it. A similar action occurs if chalk be added, but as it is more slow the effervescence is not so easily observed.

Some of the out-patients of the hospital will tell you that they frequently reject from the stomach a large quantity of clear liquid, which you will find will cause the blue color to return if tested with reddened litmus, and is therefore of alkaline, not acid, reaction. This alkaline fluid is vomited or rejected in certain cases, which are termed *Waterbrash* or *Pyrosis* (*πύρωσις*, burning, from *πῦρ*, fire, Fer Chaud in

French). The affection is very common in Scotland, but here many old women suffer from it; they often bring up a few ounces of alkaline fluid, and sometimes half a pint or even more. Sometimes the fluid, as they say, burns them as it comes up. In other cases it is described as slightly salt, or tasteless. The secretion when very alkaline would neutralize the acid of the gastic juice and greatly impair the digestive powers of the stomach for albuminous matters.

Waterbrash is often difficult to cure. In many cases the diet must be carefully regulated, so that the work of the stomach is the same for each meal. This will afford relief, but purgatives, and especially preparations of rhubarb, are often useful. Magnesia, bismuth, and ginger, and small doses of opium have also been advocated. Astringents, such as catechu and kino, sometimes do good, and bitter infusions, particularly calumba, have been given with advantage. Valerian, asafœtida, and galbanum are in the catalogue of medicines that may be prescribed in pyrosis, but I shall presently have to refer to the treatment of dyspepsia, and shall bring some other medicines under your notice.

With regard to the acid which gives its reaction to the gastric juice. Although this consists principally of hydrochloric acid, it must be borne in mind that it is by no means the only substance present having an acid reaction. We may divide the acids found in the stomach into two classes: 1. The acids formed or, at any rate, secreted there; the acid of the gastric juice, probably hydrochloric acid, phosphoric acid, and lactic acid; and, 2. Acids which are formed, and sometimes in large quantity too, in the contents of the stomach, and which are detrimental to the process of ordinary digestion, and interfere with the conversion of albuminous matter into peptones. Valerianic and acetic acids, formic acid, butyric acid, and a number of other organic acids seem to be produced in cases where digestion is

much deranged, and it is astonishing, when once these chemical changes have been initiated, with what persistence they continue, in spite of change in diet and various remedial measures.

In many of these cases too much food has been taken and has been allowed to accumulate in the stomach, and as it is not possible to neutralize organic acids which are formed by the decomposition of the food, without at the same time neutralizing the acid of the gastric juice, it is often useless to give alkalies. Sometimes, it is true, benefit does result from the use of this class of medicines. By more than neutralizing all the acids present, an increased secretion of gastric juice may be excited, but in many cases the pathological state persists, and in consequence of continuance of the process of fermentation and decomposition, fresh quantities of the organic acids referred to are set free. The patient gets thin, for most of what he eats is resolved into compounds which fail to nourish him, which indeed are not absorbed. In the management of many of these cases an almost forgotten proceeding is obviously the right one. First, clear out the stomach. Give an emetic. Vomiting is the means of curing many such cases, where a quantity of unusual acids are formed; and food undergoing various chemical changes remaining in the stomach, healthy digestion is for a time impossible. The normal action of the stomach may become completely impeded, and decomposition is excited in every form of nutrient matter introduced. People may suffer for months from a state of things which in former days would have been cured in a week or two by the aid of emetics and purgatives. Remember that you may actually enable a patient to increase in weight if you cause him to reject the contents of his stomach once or twice a week. Clear out the stomach from time to time,

and then put him on a carefully regulated diet for a week or two, and his suffering will very soon cease.

And next, as to the emetic you should employ. Warm water will answer in many cases. You tell the patient to take two or three or more glasses of lukewarm water one after the other. The stomach gets distended, nausea is experienced, and in a few minutes the greatest relief is afforded by vomiting an amount of acid fermenting matter which astonishes the patient and convinces him that the proper treatment has been adopted. Some persons can vomit without even taking warm water, by a simple effort of the will; others by tickling the fauces, and the soft palate with the finger. Mustard also may be used. A dessertspoonful of the ordinary flour of mustard, mixed with half a pint of water, will make most persons sick in a very few minutes. Ipecacuanha is one of the least disagreeable of emetics. You suspend 20 grains of powdered ipecacuanha in half a tumbler of water, and direct the patient to drink freely of lukewarm water afterwards. In the course of twenty minutes free vomiting will be excited, and the whole of the contents of the stomach will be ejected without pain or much discomfort. For a few hours after the emetic the stomach is allowed to rest. Perhaps some desire for food will be manifested, and then it will be found that the mucous membrane has resumed its normal condition, and that a supply of healthy gastric juice has been formed by the glands.

Flatulence, Wind in the Stomach.—I must now say a few words about flatulence or wind in the stomach—a somewhat disagreeable digestive derangement which depends in some cases upon unusual decomposition going on in the food, and in some cases probably upon the actual separation of gases from the blood, or their secretion into the stomach or other part of the alimentary canal by some of the glands of the mucous membrane. Some unfortunate

persons seem to have a baneful predisposition to inflation, and are habitually troubled with an enormous quantity of gas in the stomach. The organ is invariably greatly distended, and I am sure in some of the cases that have come under my notice the organ must have frequently contained two or three quarts of gas besides more solid contents, and this not now and then, but constantly for weeks or months, so that this state of distension was the general condition.

It has been supposed that the peculiar knocks and taps characteristic of certain spiritual manifestations may be due to the movement of gas from one part of the stomach to another, or from the stomach into the intestines. But if in a few instances these flatulent croakings are under the influence of spirits or take place in obedience to the will, there is no doubt that in the great majority of instances they occur in spite of voluntary efforts to restrain them. The gas is moved about in the stomach and intestinal canal by the action of the muscular fibres, and in the most capricious manner. Borborygmi (βορβορυζω, I made a dull noise) are a serious annoyance, and on occasions a misfortune, as, for instance, when they trouble the sufferer in a select company during a pause in general conversation. It is a very common ailment, and people often complain that they have wind in the stomach or bowels, and much desire to be relieved. You must, therefore, pay attention to the matter, and study the circumstances favorable to the development of the unpleasant phenomenon, and the methods by the help of which you may be able to give relief. Sometimes by setting right the process of digestion, you may relieve the patient. Pepsin alone continued for a week or two sometimes effects a complete cure. In very obstinate cases, occurring in people who live too freely, it may be necessary to begin with an emetic, followed up by a restricted diet

for some weeks. Occasionally an emetic will effect a complete cure.

Another very valuable remedial measure consists in purgation. You give a smart purge, say a three-grain calomel pill, at night, and on the following morning a black draught or some sulphate and carbonate of magnesia in peppermint water with a little ginger. In this way the contents of the alimentary canal are got rid of, and then after careful dieting for a time the patient completely recovers. In not a few cases you may relieve these symptoms by mitigated starvation. Of course, if a patient came to you and you told him to starve himself, you would never see him again. But there are many ways of inculcating good advice without shocking the nerves of sensitive people who suppose that abstinence from food for a few hours means death. Tell your patient not to take any solid food for a week. Order him a little beef tea three times a day. Towards evening he may have with it a biscuit, or a little dry toast. If very hungry you may permit him to take a little bread and butter, but a cup of lentil gruel will be better for him, and will be found more satisfying. By a little exercise of ingenuity you may suggest various things to take that will satisfy him, but which altogether will not amount to much. In this way, in the course of a few days, the effect desired will have been accomplished. You permit as little as possible to pass into the alimentary canal for a time. Some prefer to be ordered to have nothing but oatmeal or lentil gruel for a few days. The last is a really valuable thing. It is nutritious, satisfying, and acts as a sort of soothing poultice to the stomach and intestinal canal. Tell the patient to live on this or on Revalenta Arabica if he prefers it for three or four days, and in this way you will probably get the action of the stomach and bowels right, and completely

relieve all dyspeptic symptoms, and the flatus from which the patient had long been suffering will be no more generated.

General Observations on the Treatment of Ordinary Forms of Indigestion.—I shall not pretend to discuss this large subject exhaustively, but endeavor rather to direct your attention to some general remedial measures which you will find useful in your practice. Sometimes there is actual discomfort when the stomach does not digest the food as rapidly as it ought to do. The patient feels full and uneasy for several hours after a meal has been taken. Very commonly under these circumstances sleep is disturbed, or perhaps cannot be obtained. Those who dine too late in the evening often find that the stomach does not work well. The food in consequence remains in the organ in an undigested state. It is being continually moved about and worked up by the unceasing contraction of the muscular coat of the stomach, but still its volume is but little changed, and the stomach remains much distended. A feeling of general discomfort results, which interferes with sleep. This, in fact, is a very common cause of wakefulness. The patient in consequence soon becomes weak, feels fagged, and unable to work. The sense of lassitude, and failure, and sometimes extreme despondency, suggest to him the need of "support." Friends advise him to partake more freely of nutritious food—port wine, turtle and ox-tail soup, and other highly nutritious delicacies are wasted upon him, for instead of improving he gets worse, and feels more ill and unfit for business than ever. Knowing the importance of rest he flies to soporifics, takes chlorodyne, nepenthe, or chloral, and thus possibly adds to his many troubles a terrible headache, general nervousness never before experienced, tremor of muscles, and dread of impending failure of health. He tells you that he really feels very ill indeed. A few inquiries and a little

consideration on your part will enable you to afford speedy relief. You will direct your attention to the state of the digestive organs. A mercurial purge, followed by a few doses of some gentle laxative, will afford relief to all the more serious symptoms, and then you must attend to the digestive process. Diet the patient carefully, only allowing easily digestible substances, and in very moderate quantity for a week. But sometimes a single purgative dose will not suffice. You must bear in mind that in many of these cases the muscular action of the stomach and small intestines, or the sensitive surface which plays an important part in the reflex action is at fault, and medicines which encourage the muscular contraction and the driving down of the intestinal contents will be required. Castor oil, Rhubarb, in powder or in pills, Colocynth, Podophyllin, are often of great use in some of these cases; but as I shall have to consider their action under the head of purgatives, I need not say more here. Advise the patient to take small doses of dilute hydrochloric acid half an hour before food, and his digestion will soon be restored. Hydrochloric acid is, as you know, the natural acid of the gastric juice, and if you continue to give it for some time, you will find great improvement not only in the digestive power of the stomach, but in the performance of their function by other parts of the alimentary canal. You must not forget that from ten to twenty drops of this acid before meals is also of great use in treating very many cases of weak digestion. *Acids* of various kinds are very valuable in certain forms of dyspepsia. The dilute hydrochloric acid, *Acidum Hydrochloricum dilutum*, and the nitrohydrochloric acid, *Acidum Nitrohydrochloricum dilutum*, are most useful, and by their aid you may cure many cases of dyspepsia. There is more than one distinguished physician in London whose reputation, it may almost be said, has been gained by ordering acids. There can be no

doubt of their efficacy. Phosphoric acid, the *Acidum Phosphoricum dilutum*, in doses of twenty drops in water, seems to suit some people better than the other mineral acids. Lactic acid has also been prescribed; but upon the whole I think you will find the acids I first mentioned generally answer. If you prescribe from fifteen to twenty minims of the dilute nitrohydrochloric acid with half a drachm of Tincture of Orange, *Tinctura Aurantii*, a like quantity of the Syrup of Lemon, *Syrupus Limonis*, and perhaps ten drops of Chloric Ether, *Spiritus Chloroformi*, with an ounce or an ounce and a half of water,—you will order a dose which will please your patients and will be of great service to them. The mixture should be taken twenty minutes or half an hour before food twice or three times a day. In some cases it is well to add ten drops of Tincture of Ginger. I have known people continue this mixture for six or seven months at a time, and with great benefit. It is better to encourage them to give it up now and then, but if they persist it can do no harm, and may prevent them from indulging in alcohol. Lemon juice, Citric Acid, the Acid Tartrate of Potash, *Potassæ Tartras Acida*, and other organic acids and acid salts have been found of great use.

If decomposition take place in some of the constituents of the food after it has been some time in the stomach, instead of the ordinary alteration proceeding until complete solution is effected, as I have already said, a large quantity of fetid gas may be generated. In these cases you will sometimes find benefit will result from an opposite plan of treatment: From giving alkalies instead of acids. The alkali is usually given after food, but I have found that in some of these cases where gas is generated in quantity after food is taken, it is advantageous to give it about ten minutes before food. You may order twenty drops of Liquor Potassæ and some Tincture of Ginger in water, and some-

times you will find that five minims of Liquor Ammoniæ will answer better than the Liquor Potassæ. It is probable that the alkali acts by exciting the secretion of an excess of acid which at once exerts a solvent action; for the condition we are speaking of may sometimes be relieved by taking a stimulant remedy which excites the flow of gastric juice, such as brandy, or ginger, or pepper, without giving alkali at all.

In some obstinate cases the plan of giving hydrochloric acid before meals, and carbonate of soda or potash, or liquor potassæ, or liquor ammoniæ after meals, has succeeded after many other modes of treatment had completely failed. If I want to give an ordinary alkali, I often prescribe twenty grains or more of Bicarbonate of Soda, *Sodæ Bicarbonas*, in an ounce of water. You may order Peppermint, or Pimento, or Cinnamon water, *Aqua Menthæ Piperitæ*, *Aqua Pimentæ*, *Aqua Cinnamomi*, as you may think best, and you will find that two or three drops of Dilute Hydrocyanic Acid, *Acidum Hydrocyanicum dilutum*, and a few drops of Tincture of Ginger, *Tinctura Zingiberis*, will improve the dose. Some physicians prefer Bicarbonate of Potash, but Liquor Potassæ in my opinion is better than either, at least in many cases, and *Liquor Ammoniæ* may be of use in cases in which other alkaline remedies do not agree.

Preparations of Bismuth, too, are often very useful in some of these cases. You may order from five to twenty grains of the old Nitrate of Bismuth, *Bismuthi Subnitras*, or about the same quantity of the Carbonate of Bismuth, *Bismuthi Carbonas*, suspended in an ounce of water by the help of a little mucilage, and flavored with Ginger, Peppermint, or some such substance. Or you may choose one of the more elegant preparations of Bismuth, of which so many are now made. We have a solution of Citrate of

Bismuth and Ammonia, *Liquor Bismuthi et Ammoniæ Citratis*, in the Pharmacopœia, of which a dose of from half a drachm to a drachm may be given in a diluted state; but many other solutions of Bismuth supposed to be improvements upon this have been recommended. Bismuth lozenges, *Trochisci* (τροχος, a wheel) *Bismuthi*, are also a convenient form in which to give this remedy.

Preparations of Iron, Arsenic, and Zinc in small doses seem to do good in some instances, and when the mucous membrane is unduly sensitive and irritable, you may find that small doses of Conium, Hyoscyamus, morphia, or opium will do more good than anything; but of these I shall have to speak in another place.

In cases of very obstinate flatulent indigestion and croakings (Borborygmi), advantage may result from the use of pungent substances, like Horseradish, peppers of various kinds, as well as ginger. The Compound Spirits of Horseradish, the *Spiritus Armoraciæ Compositus* of the Pharmacopœia, is not used now as it used to be; but it is well to bear it in mind, for it is a most useful preparation. You may order half a drachm or more in an alkaline or acid mixture, or with one of the preparations of bismuth.

As to condiments generally, I would remark that if taken with judgment, and only occasionally, they do no harm, and most persons as they advance in years indulge in them, but it is bad in many ways for a patient to get into the habit of taking very strong peppers, for after a time the stomach fails to work without its artificial stimulus, and may become very weak indeed. Unquestionably as regards children and young people, "Optimum condimentum est fames;" but as we get older and gradually become more and more affected by the customs indulged in by the more fortunate of our friends and approved by the rest, we lose appetite and forget what it is to feel hungry. We begin to

appreciate delicate flavors, and to learn to like sauces. Sapid materials are desired, and often too freely indulged in, until we arrive at that highest pitch of degradation, liking and longing for delicate viands, desirous of dining daily, and giving our hearts to friends who are rich enough to possess a skilful cook.

Few men are more injudicious in the management of their digestive organs than well-to-do Englishmen. Not a few who go to India and other hot climates must live as they have been accustomed to live here. They tell you they must daily have a good meat meal, or they would certainly lose their strength. They cannot digest as much meat as they desire, so they get into the way of taking large quantities of pepper. Curry, which is a mixture of pungent seeds and peppers ground very fine, is very popular. No doubt it is appetizing, and the flavor of a well-made curry is certainly very pleasant to the palate of most persons—even to those who have no pretension to be considered epicures, or good judges of delicacies. Curry has become a very favorite dish with Europeans who live in India and other hot climates because of its stimulating action, and because it helps the stomach to digest a greater quantity of meat than could be properly dissolved and absorbed without its aid—not that the partaking of a rich meat diet is desirable, for in hot climates, very little meat is required. Our system of dining off a number of rich meats as many do day after day is bad enough, and damaging to the organism in this cold, damp, changeable climate, but in the hot parts of the world the practice is disastrous. There, diet should be light, and should consist principally of vegetable matter. But too many consider that if they do not take much meat they must take much beer, and not a few will insist on damaging their stomachs with liqueurs or brandy, and brandied wines. Derangement is soon fol-

lowed by serious illness. The liver, kidneys, and all parts of the alimentary canal become highly congested, and weeks or months of rest and carefully regulated very moderate diet are necessary to gain for the patient a valetudinarian existence. Every one going to a hot climate should study physiology sufficiently to understand the importance of living according to reason, and the penalties that must be paid for indulgence. Or let him draw conclusions from what he observes concerning the food of the people around him. He may take fruits and vegetables, farinaceous matter of various kinds, milk and eggs, and just meat enough to satisfy his prejudice in favor of this kind of food. But he will be very unwise to allow himself to get into the way of constantly stimulating the gastric and other glands by strong peppers in order that the undue action required for the digestion of considerable quantities of meat should be established.

Again, those who come from a hot to a temperate or cold climate will do well to modify their diet. They should consume more butter, cream, and milk than they would desire or find agreeable in a warm climate; the quantity of meat may be increased, and possibly some will find benefit from taking a little alcohol.

Alcohol, though apparently desirable in the case of some living in cold climates, is very deleterious in hot ones. It is a remedy which is often employed in certain forms of dyspepsia, but it is a dangerous one. Drinking habits are very easily acquired, and although a little alcohol will often remove discomfort and assist digestion, many find they can no longer digest without it, and not only so, but gradually increasing doses are taken as required. Far better suffer dyspepsia than run the risk of bringing on a worse form of the disorder, or initiating serious morbid changes in various tissues by taking too much alcohol.

External applications are sometimes beneficial; stimulating liniments gently rubbed on the skin over the region of the stomach. Sedative applications externally are also often recommended. A belladonna or opium plaster will cure some persons, while others derive more benefit from ordinary counter-irritants. A mustard poultice, a poultice consisting of equal parts of mustard flour and linseed meal, or a mustard leaf, a piece of wet writing paper being interposed between the mustard and the skin, is often tried with advantage. And you must not forget the very simple and efficacious measure of applying wet rag covered with oiled silk or a piece of Spongio-piline, moistened and worn over the upper part of the abdomen for two or three hours daily. This is pleasant to wear, soothing, and often useful.

Although in cold weather digestion is often very good, and not uncommonly weak stomachs work better in cold than they do in hot weather, there can be no doubt that some of the most obstinate forms of indigestion arise from the body not being sufficiently protected. Those who adopt light clothing in an ungenial climate are very likely to suffer, and I feel pretty confident that next to injudicious eating and drinking, injudicious clothing is the commonest cause of various diseases, among which are some of the most serious we have to treat. The fear people express of being too thickly clad in this climate would be ludicrous if the consequences were not often so serious. The young of both sexes are the chief offenders in this particular, and many an attack of rheumatic fever, of bronchitis, of pneumonia, and of other serious maladies has been due to light clothing. Now, although I admit the amount of woollen suitable for all who live in such a climate as this is uncomfortable, nay, disagreeable, for a fortnight or three weeks in some summers, I have never known any illness brought on by the practice. To be bathed in perspiration from

morning to night and from night to morning is not pleasant, but neither is it dangerous, and it is better to endure such discomfort during our short summer, than run the risk of taking cold in consequence of a change in the weather finding you insufficiently protected. Depend upon it, people had better clothe very warmly in winter and not change in the summer, than be insufficiently protected at any period of the year. I should say woollen should be always worn next the skin by all, though in the hottest weather it may be somewhat thinner than in the winter. Of course you do find exceptional people who do not need this, just as you find people who eat and drink enormously without paying any penalty for their excesses; but we must advise persons as if they were average organisms—not exceptions to the general rule. In strongly recommending a very decided additional protection to the delicate nerves and vessels of the skin to that afforded by the thin epidermis (ἐπί, upon, δέρμα, the skin), which forms a very essential and absolutely necessary part of us, I confess to one considerable difficulty, and this is to name the material which may be worn by every one without discomfort. It is curious that with all the ingenuity exhibited in the woollen manufacture no texture has yet been invented which is wholly satisfactory to wear next the skin. Nothing I believe is to be had better than good flannel, but it is practically difficult to get flannel garments made to fit comfortably; and unless great care be taken to shrink the flannel thoroughly before it is used, uncomfortable diminution in all directions will soon be manifest and will progress. The ordinary woven goods are still worse in this respect, and those who purchase things to fit them find in the course of a few months that they are so small as to be most uncomfortable. Nevertheless, you must advise your patients of both sexes to wear woollen of some kind next the skin. For the weak and

sensitive this protection is absolutely necessary, and the strong and healthy will, by adopting this course, escape many small derangements. Wash leather has been recommended. It is comfortable, but too warm during the greater part of the year. Like silk, it is very expensive, and there are other objections to its use which I need not describe in detail. Upon the whole, good soft flannel I believe to be the best texture yet made for wearing next the skin, but if people absolutely object to flannel you must advise them to wear silk, or some very thin unirritating material under the flannel. Those who wear woollen underclothes may go out in all weathers, and never require the very heavy and oppressive overcoats, which are such an incumbrance in walking.

Indigestion from Failing Glands, as in Old Age.—But there are cases in which the stomach loses its power. The action becomes weaker. The glands require some artificial stimulus to excite them to discharge the proper amount of work. As we get older we become more particular as regards the flavor and other characters of what we eat and drink, and many cease to feel that desire for food, that pleasant feeling of hunger, which is worth more than excellence in cibo-critical powers. As a general rule, you notice that gentlemen over forty are more particular as regards their dinners than gentlemen of twenty-one, while even working men of fifty or sixty years of age look upon a quiet good dinner as a very important and not unpleasant portion of the daily round of life. A boy or a young man in perfect health and vigor digests without knowing that he possesses digestive organs, but if the stomach becomes weak, its owner gets particular, and the food he eats must be nicer as well as more digestible. And so it comes about that increased interest is taken in cookery, and the cook becomes a person of the highest consequence. In old age

the stomach often becomes so weak that only certain well-cooked and very delicate things can be digested. Sometimes the stomach fails altogether, and we have to adopt various expedients to keep old patients alive.

You must also bear in mind that a very common cause of indigestion, in advanced age, and in but too many instances long before, is the failure of the natural comminutors of the food to perform their office. The teeth, from defective formation and growth during the early period of life, have nearly worn away or they have decayed, or perchance the gum has altered in structure and they have dropped out. The consequence is that practically there is no proper mastication, the food is very imperfectly comminuted, and far too little saliva mixed with it. It is often necessary to ask a patient, or you may ascertain for yourself with due care, whether he is able to bite.

If, as sometimes happens, the food passes into the stomach in large boluses, but a small portion, in fact, only the surface of the mass can be subjected to the action of the gastric juice, and if the meal is a large one, a very small portion only will be properly digested. The rest gradually passes onwards in a state not fit for absorption, or it remains until the next meal is taken, and increases the confusion in the stomach. Do not forget that many cases of imperfect digestion depend upon the bad state of the teeth. If you do not find this out you may go on prescribing a number of useless remedies, to the disappointment of your patient and to the loss of your credit. There are people even under thirty who are incompetent, from a dental point of view. Happily the condition is a remediable one, and the new organs which can be supplied by art are, in some cases, superior to those developed by nature operating under the sad disadvantages imposed by the ignorance and wickedness of man. A patient may be provided with artificial teeth

which will work better than his own, though he may have to suffer some unpleasant twinges before his mouth is set right for mastication under the new circumstances. When, therefore, you are consulted about difficult or weak digestion, or indigestion, it is very necessary to examine the mouth with the view of ascertaining the general state of the teeth, and whether the patient can or cannot masticate properly.

And now let me revert to those cases where the digestive power of the stomach becomes weak because the gastric glands have gradually wasted, and perhaps are shrivelled and incapable of secreting gastric juice either good in quality or sufficient in quantity. When one considers the immense quantity, amounting perhaps to ten or more pounds, of gastric juice, formed during every period of twenty-four hours, one cannot wonder that the secretion should much diminish as the vigor of life becomes impaired and reduced. As age advances the gland-cells become more feeble and act more slowly. They participate in the general shrinking and wasting, and change into connective tissue, which go on in other organs and interfere with the due discharge of their functions.

If digestion is impaired, the proper amount of nourishment absorbed will be less than is required, and persons who suffer for some time become weak. The muscles lose their vigor and the tissues generally suffer. Much of their substance is absorbed, and in some cases there is considerable wasting. Patients frequently get perceptibly thinner, and become unable to discharge their usual duties properly. In too many instances, in consequence of such phenomena going on for a considerable time, the organism loses its power of resistance to adverse circumstances, and the patient becomes liable to special morbid changes, affecting lungs, liver, or kidneys, and many suffer from intercurrent mala-

dies, which may cut short life. A state of weak health may be engendered, the blood becoming very much altered in quality; and not unfrequently morbid conditions are developed, which are known to be due to an unhealthy state of the circulating fluid. The blood may coagulate in capillary vessels and small veins; and in the changes resulting from the stagnation, substances are formed which, re-entering the blood, may poison or otherwise damage the system. The most complex changes, and serious forms of disease, may be primarily dependent upon an imperfect action of the stomach and upper part of the bowels.

When the digestion is found to be permanently impaired during the earlier period of life or in old age, from the occurrence of degenerative changes, can anything be done to relieve the patient, to retard the progress of the malady and avert death? You may often improve digestion by giving those acids which I have before referred to. Even where there is a gouty tendency, and you would be disposed to prefer alkaline to acid remedies, you will not unfrequently find in practice that mineral acids before meals will greatly benefit the patient. In some of these gouty cases, in which many different plans of treatment have entirely failed, I have found advantage from giving mineral acids before, and alkali after meals. You will also discover, in the course of your practice, that a grain of calomel or two grains of gray powder (*Hydrargyrum cum Creta*) with three or four grains of compound Colocynth pill (*Pilula Colocynthidis Composita*) once or twice a week, will be of immense service in many cases where the liver is congested or sluggish, as well as the stomach out of order. The following mixture half an hour after breakfast, lunch, and dinner is often of great use to those who have any tendency to the state of system which precedes the development of gout. Fifteen or twenty minims of *Liquor Potassæ*, five

grains of *Nitrate of Potash* (*Potassæ Nitras*), ten minims of *Tincture of Ginger* (*Tinctura Zingiberis*), a drachm of *Tincture of Hop* (*Tinctura Lupuli*), and one ounce of *water*. There is, however, one remedy which often succeeds in cases in which other plans of treatment have completely failed. The remedy I refer to is Pepsin.

Of Pepsin and its Uses.—Pepsin has been introduced into medicine for a period of some thirty years or more, but a certain number of medical advisers during every portion of this time have confidently pronounced it a worthless remedy, and one that, if it acts at all, acts by pleasing the fancy of the patient. Not a few have spoken of it as a ridiculous thing altogether, as a substance that has no power and does not relieve. But by this time if pepsin were really useless, like hundreds of other things which have been introduced, become fashionable and fallen into disrepute, it would have been entirely discarded, if not forgotten. But what is the fact? In spite of many adverse circumstances, pepsin is probably more used than ever, and is now made and prescribed in every part of the world. Many different preparations of pepsin are sold to the public. Some are extensively advertised and their value extolled in superlative expressions. Large sums of money must be annually devoted to the purchase of different preparations stated to be composed of pepsin. Some persons have no doubt found out that at least certain of these preparations are of real use. They speak highly of them to their friends, and thus the demand increases. At this time there are not only a vast number of different forms of pepsin to be had, but you may obtain the remedy in many different forms. There is pepsin in powder, pepsin in pills, pepsin in lozenges, pilules of pepsin, pepsin wine, and pepsin in glycerin. Considering how many years pepsin has been in the market, it is certain that a great

number of people have found it of use to them. The demand thus created for a really valuable remedy has led to the supply not only of the real thing, but to a number of cheap and worthless substitutes. Some preparations exist which possess little or no solvent action. He who recommends pepsin, or takes it, ought to be sure that the material is really what it purports to be. Although it is very easy to adulterate this substance or to pass off something else in its stead, it is fortunately also very easy to ascertain whether the pepsin possesses the proper degree of digestive efficacy. One grain of this powder should digest 100 grains of the boiled white of egg.

In order to test the value of any particular specimen of pepsin you proceed as follows: 100 grains of hard-boiled white of egg cut into thin slices may be placed in a wide-mouthed bottle or flask with one ounce of water, and 20 drops of hydrochloric acid (*Acidum Hydrochloricum dilutum*). One grain of pepsin is to be added, and the mixture placed before a fire, at a temperature of about 100° F. The flask is to be shaken from time to time. In about an hour the white of egg begins to look transparent at the edges, and in about four hours it will be completely dissolved if the pepsin is good. Pepsin will dissolve white of egg at ordinary temperatures in a longer time (from twelve to twenty-four hours).

Now, as less than one single grain of pepsin will digest 100 grains of the white of egg, two or three grains would digest as much meat as would be found in the "eye" of a small mutton chop. Three or four grains, therefore, of good pepsin is a sufficient dose, and will enable a patient to digest a small meal of meat even if the stomach secretes hardly any pepsin at all, but, as a general rule, pepsin is only required to set the digestive process going, and probably much more than the amount of meat which an invalid

would require would certainly be dissolved by the dose of pepsin taken.

You should obtain different preparations of pepsin and see whether they really possess the power of digesting white of egg, and you may be sure that those preparations which will not digest artificially the albumen in the flask will not digest food in the stomach, and should therefore not be prescribed. You may not only easily ascertain whether the pepsin you purchase is good or not, but if you choose to take a little trouble you may make your own pepsin. There is no difficulty or uncertainty in the process if a little care is taken. When I held the Professorship of Physiology, I used to show to the class, as my predecessors had taught me to do, the action of the gastric juice upon different kinds of food. But it was always very difficult to prepare a satisfactory digestive solution. We used to make an infusion by soaking for a time in tepid water pieces of the fourth or true stomach of the calf. A little acid was then added, and the viscid mixture was strained through muslin. But it was often difficult to strain it properly, and at best we had a thick ropy mass which was by no means clear and transparent, and could not be made so by filtration. Many of the students of those days were skeptical and probably concluded that I had carefully rounded off the edges of the albumen so as to make it appear as if digestion had commenced, and some were not satisfied that the viscid opalescent mixture did possess the solvent action that I attributed to it. I was therefore induced to try whether I could not obtain a digestive solution as clear as water, in which every stage of change occurring in substances placed in it could be carefully watched from first to last. In the first place I followed the instructions given by scientific chemists, and after conducting a number of complex chemical operations with the invariable result that the greater part of the pepsin

I was in search of was decomposed in the course of the chemical processes to which it was subjected, turned my attention in another direction. The processes for isolating the pepsin which I tried turned out so very unfortunately that I determined to try to find some new method of getting a clear solution possessing digestive properties. As usually happens, after having tried somewhat complicated plans of proceeding, one gradually comes to adopt more and more simple methods, and at last an efficient process which can be readily practiced is discovered. I taught myself to prepare an artificial digestive fluid by a process so simple and obvious that one wonders no one had employed it before, but I believe that up to the time I put it into practice, 1856–57, no one had ever thought of the process. In considering the digestive process as carried out in different animals, it soon occurred to me that there was one domestic animal whose diet coincided more nearly with that of the human race than any other. The sheep and the ox were evidently less likely to possess a potent digestive material adapted for dissolving albuminous matter than the pig. There are few things this animal will not digest, and very quickly too.

I therefore selected the stomach of a pig. A pig's diet contains animal as well as vegetable matter, and I need not tell you of the extraordinary quantity of nutritious substances of all kinds that a pig will consume and digest without difficulty. It seemed, therefore, not improbable that the best and strongest gastric juice would be found in the stomach of the pig.

I procured some fresh stomachs and, after slitting them open, and removing the contents, dissected the mucous membrane from the muscular coat. This must be done, because the mucous membrane is thrown up into a number of thick folds, and we require it to be laid out smoothly on

an even board. When the thick mucous membrane is thus spread out, a little water is allowed to run over it so as to remove much of the dirty mucus and the remains of the food,—and pigs' food is not of the nicest character. You have now a soft, tolerably clean, smooth mucous membrane, which, in its entire thickness, consists of hundreds of thousands of pepsin-producing glands. But the gland-tubes are very minute. How are we to get the modicum of secretion which each contains? The mouths of the little glands open on the free surface of the mucous membrane. It occurred to me that, if I could only squeeze these glands, I could press from the tube the active digestive substance which each contains, and without exciting any chemical change in the substance or causing its decomposition. I took a paper-knife, and by firmly scraping the surface in one direction, I squeezed out the little drops of mucus from the gastric glands, without any difficulty whatever. In this way you may get three or four teaspoonfuls of the thick viscid mucus from a single stomach. This substance is not a very convenient material for experiment. It will not dissolve in water, though it may be diffused through it; but the mixture is viscid, will not filter, and is easily decomposed. It is not suitable for delicate experiments.

Having thus procured active material in the active state in which it is formed in the body of the animal, I thought that, in order to prevent decomposition, the best plan would be to dry it as soon as possible; so I got a piece of glass, about a foot square, and spread the mucus in a very thin layer over its surface. This was next quickly dried, at a temperature of 100°, before the fire, a current of air being allowed to play freely over it. In from twenty minutes to half an hour the mucus became perfectly dry, and was easily scraped off the glass and powdered in a mortar. It formed a tolerably fine powder, which had scarcely any

smell, but tasted a little salt. I found that, if I took a pinch of this dried mucus and mixed it with a little tepid water, I no longer got a ropy mass, but a mixture which, by filtration, yielded a perfectly clear fluid. You may, without difficulty, make an acid infusion of the mucus from the pig's stomach, by adding to the dried mucus and water a few drops of dilute hydrochloric acid. You will then have a very active digestive fluid, which, after standing for an hour or so with occasional stirring, will be found to pass through the pores of the filter. The filtrate will be as clear as the purest water; indeed, you would not know it from water. If you perform the experiment with white of egg, described in page 113, and place the flask at a temperature of 100°, you will find that the clear solution possesses very active digestive properties. You may try various experiments, for the fluid being so very clear you can watch the changes which take place, and study the process of digestion with facility.

Having obtained this dry powder from the mucus secreted by the gastric glands of the pig's stomach, and found that such excellent artificial digestive fluids could be easily prepared with its aid, I thought it well to try it medicinally as an aid to digestion, in the hope that it might be more efficient than many of the preparations of pepsin at that time in vogue. Therefore I swallowed a little of the dried powder, and found that it did me no harm. Then I made some into three-grain pills, and took one before each meal for several consecutive days. Infusions were prepared, which I drank, and I found no inconvenience whatever from their use. After a time I prescribed the medicine, and soon found that it was really useful in helping digestion, relieving the uneasiness accompanying the process in many cases, slightly encouraging the action of the bowels, and preventing the development of flatus in many instances

in which inconvenience and suffering resulted from this circumstance. Indeed, one could not help coming to the conclusion that this would be a very useful remedy in many cases where the digestive power of the stomach was extremely weak. A small quantity of the powder, mixed with the food of infants, assists digestion in many cases where it is very imperfectly performed, and, in old age, it is most valuable, for many old people whose digestion is greatly impaired may prolong their lives, by helping the process of digestion by the introduction of a little of the powdered mucus from the pig's stomach.

By careful microscopic examination I satisfied myself that there were no substances in it likely to do harm, and though I have examined the mucus from the pig's stomach in very many cases, I never once discovered an entozoon of any kind, or an ovum of an entozoon. When one considers how quickly the mucous surface is formed and cast off in the discharge of function, one is not surprised at this. Indeed, though of course the possibility of such bodies being present occurred to me at the outset, and has doubtless occurred to others, the facts of the case render it very improbable indeed, and such an objection to the method of preparing pepsin powder rests on no foundation in fact. I therefore had no hesitation in taking and recommending the remedy. The next thing to do seemed to be to try and get some one to prepare this pepsin in quantity so that the profession might prescribe it, and patients have the advantage of its action. I therefore spoke to Mr. Bullock, of the firm of Bullock & Co., whom I had known for many years as a scientific chemist of the highest character, and begged him to try the process, and see if he could arrange for a sufficient supply of pigs' stomachs to make the powder in quantity. This was more than twenty years ago, and the remedy is now made in very large amounts both here

and in America, and is used in every part of the world. The process I adopted for making it was described in the first volume of the *Archives of Medicine*, page 269. Mr. Bullock has, I believe, made some improvements in the details of the process of preparing the material, and by great care and rapid drying the proper degree of activity of the solvent matter is insured, and maintained at the same standard in every specimen that is made. Any of you can test the action of the *Pepsina Porci* in the simple manner I have described in page 113. You will find that a single grain, in point of fact 8-10ths of a grain, will digest 100 grains of the white of egg. In a common bottle before an ordinary fire it is interesting to watch the opaque albumen becoming gradually translucent, and the transparent albumen gradually breaking down until a complete solution, a peptone, is formed. In this way you may get what is known as albumen peptone.*

There is another class of cases in which pepsin is of the greatest service, and you must not neglect to employ it. In cases of fever the action of the stomach is more or less disturbed. Indeed, in all fevers the process of digestion seems to be greatly deranged. Upon the feverish state being induced in your own organism, one of the first points you

* The only objection made to the process I have recommended is a very strange one, urged by Mr. Squire, who says that the pepsin made by it contains epithelium, and that if exposed to a damp atmosphere "it becomes putrid more or less, and acquires a most repulsive odor." But who would place pepsin or any other organic substances of any kind in a damp atmosphere? Does Mr. Squire mean to suggest that the pepsin made by him, or any other pepsin in the world, will not putrefy and acquire a most repulsive odor if placed in a damp atmosphere? The substance that does not change under these circumstances cannot be pepsin. The test of pepsin is its solvent power, and the dried mucus of the pig's stomach is in this respect so potent that 8-10ths of a grain will dissolve 100 grains of coagulated albumen.

notice is that you have no appetite, you no longer feel the ordinary desire for food. When mealtime arrives you are disinclined to eat. If, therefore, you find a patient who perhaps has been suffering from fever for many weeks, when emaciation is extreme, and the strength almost exhausted, you should carry out the suggestion I have offered, and add pepsin to the milk and beef tea in the proportion of three or four grains to a pint. Milk will be coagulated in the first instance, but afterwards it will be partially digested and the curd may be broken up into small pieces. The whey and curd will be in a state favorable for digestion, and for being rapidly absorbed and appropriated to the nourishment of the tissues. If the fever is of a kind which continues severe for a considerable period of time the body may lose very much in weight, the patient becoming excessively weak and his life being for some time in jeopardy. Under such circumstances it is of the first importance to support the strength to the utmost. By mixing a little pepsin with the food you greatly assist the digestive process, it may be during a very critical period of the malady, and the nutriment being in the form of a peptone is in a state fit to be immediately taken up by the vessels, and converted into blood constituents. I have lately had under my care a poor girl who became excessively emaciated in a prolonged attack of typhoid, the temperature varying from 102° to 105° during a period of six weeks. About the first week distension of the stomach and bowels by gas became considerable, and added much to the distress. I gave six grains of pepsin daily with a little hydrochloric acid in the beef tea, and kept this up during the whole period of the illness. The distension became less after a few days, and I think that this simple plan had much to do with recovery in this particular case. In the case of beef tea you may with advantage add a little hydrochloric acid, and place

the mixture before the fire at a temperature of 100° for an hour or two before the patient takes it. He will not dislike it, and to some the acid beef tea is even pleasant. But generally when patients are as ill from fever as I am supposing, the taste is very much impaired, and practically there is no difficulty in getting persons to swallow the easily digestible peptones in the form of beef tea. Peptonized fluid meat was first made, I believe, in quantities some years ago by Mr. Darby. This may now be obtained in small pots or bottles in a form in which it will keep good for some time, of Messrs. Savory & Moore, 143 New Bond Street.

Do not, therefore, forget this hint as regards the treatment of very bad cases of fever, and of prolonged exhausting disease, when too little nutriment is absorbed for the support of the patient in consequence of the imperfect action of the stomach, for now and then I have no doubt a life may be saved by the practice I have described. Or another plan based on the same principle may be adopted. Instead of giving strong beef tea or soup containing pepsin, you may make a sort of meat jam. Underdone or perfectly raw mutton or tender beef may be cut up into small pieces, put into a mortar and well beaten with the pestle until it forms a soft pulpy mass. You may then add a small quantity of salt to make it palatable, and beat up with it some pepsin in the proportion of ten grains of the powder to the ounce of meat. A drachm or more of dilute hydrochloric acid is to be poured in and all mixed well together. If you choose you may add a little sugar instead of salt to the mass, which forms a paste which may be spread upon bread and butter, or diffused through beef tea. Children and many invalids will often take a compound of this sort when it is difficult to persuade them to take ordinary meat food at all.

In some cases we cannot feed the patient at all by the mouth, for everything that touches the mucous membrane of the stomach immediately excites the most violent vomiting, and the condition occasionally lasts for so long a time that there is danger of death by inanition. In these, as well as in those bad cases where there is a physical impediment to the entrance of food into the stomach, or to its escape from the organ into the duodenum, we may keep the patient alive for some time by injecting nutrient substances in small quantities (an ounce to three or four ounces) at a time into the lower part of the bowel. The nutritious matter dissolved, or suspended in some mucilaginous substance like boiled starch, is taken up by a small elastic syringe made for the purpose and slowly injected into the rectum, the operation being repeated every three or four hours. To the beef tea employed for this purpose it is well to add two grains of pepsin to the ounce. The rate of its absorption is probably increased, and it is more easily assimilated and taken up by the vessels of the mucous membrane. Pepsin is of great use in restoring digestive power, which is weakened or suspended for a time. In this way its use in advanced age may often be explained, for although the action of the stomach may be very much impaired, you may, by adopting various expedients, succeed in restoring the normal action, and then it will go on perhaps for a long while perfectly well without any artificial help.

OF CONSTIPATION.

We must now consider a very important and almost universal accompaniment of the most common forms of deranged digestion and indigestion, and of which the majority of persons have to complain. This is constipation, a condition which varies greatly in degree, and which would,

perhaps, generally be more correctly described as imperfect or insufficient action of the bowels. Probably nearly every one of us has suffered more or less from this trouble at some time or other. And those who are accustomed to sedentary intellectual work have usually a more extended experience of this derangement, than those who are accustomed to take a good deal of exercise, and those who have to live by bodily labor. But I suppose there is no one who follows any walk of life whatever, or who does not follow any walk at all, who has not experienced this derangement. The most idle, as well as the most industrious, often have to complain of constipation. Constipation afflicts people of all ages and of all classes, and in all climates. It is probably one of the most common of the small derangements to which civilized man is subject. Whether savages suffer from this condition I do not know, but unquestionably the majority of persons forming a civilized community experience the discomfort of constipation.

The word "*constipation*" comes from the Latin "*constipare*, to crowd together." Generally speaking, people attribute constipation to the accumulation of fæces in the large bowel, and infer that it is invariably to be relieved by purgatives. But you will see, as I go on, that in cases of constipation a number of points have to be considered, and that many cases so far from being relieved by the frequent administration of purgatives are aggravated by that proceeding.

Most persons empty the lower part of the large intestine, or at any rate, partially empty it once during each period of twenty-four hours. But some persons' bowels have a habit of not being relieved oftener than every other day; some have an evacuation once in two or three or four days, and a few females maintain that once a week is enough to empty their bowels, nay, I have heard it asserted that an

action once in a fortnight was sufficient, and I am bound to admit that there are instances in which habitual constipation is not associated with derangement of the health, although, as a general rule, this sluggish state of the bowels brings about general disturbance of the health, and sometimes leads to very distressing results. Of course, in cases in which fecal accumulation goes on for many days, the lower part of the large bowel gradually attains enormous dimensions, and considerable stretching of its walls must ensue before it is sufficiently large to hold the excrementitious matter formed, and all the refuse material of the food which accumulates during the considerable periods of time just mentioned. I need scarcely say that this is a very unsatisfactory state of things, and if allowed to persist for years, is likely to lead to disastrous results as age advances. There is no doubt, that if the large bowel, and indeed the intestinal canal generally, is to retain its healthy state and to be preserved as a good working apparatus for sixty or seventy years, or more, it should evacuate its contents, as I have before stated, once in every period of twenty-four hours.

Many of the physiological processes of the body, like this one, occur periodically and uniformly at about the same time during each period of twenty-four hours. Habit encourages the evacuation of the bowels daily at the same time, and it is very desirable that every one should do all he can to acquire the habit. I do not think it matters much whether the bowels act the first thing in the morning, after breakfast, or the last thing at night, so that the habit is acquired and the fixed time kept. Even in the case of animals, at least domestic ones, this operation is usually performed with the greatest regularity at a particular hour. If you have a pet cat or dog, you will find it convenient to teach it to evacuate its bowels at a given time, and it is

more than inconvenient if the creature is found to be unteachable in this respect. An unteachable disposition, or disobedience, renders an otherwise valuable animal almost worthless.

You must impress upon all patients the great importance of regular habits, which are very easily acquired, and ought never to be broken through. Many small ailments and troubles of various kinds will almost certainly succeed carelessness in this particular, and serious maladies sometimes commence from disregarding advice.

Having referred to the desirability of regular action, I must now try to impress upon you the equal importance of complete, or nearly complete, evacuation of the lower part of the large bowel. You may have what is called regular action associated with very imperfect removal of the contents. Although a small quantity of fecal matter is daily discharged, this bears so small a proportion to the quantity formed, that there is a constantly increasing residue, which goes on accumulating, to the great discomfort of the patient and the derangement of his health. In not a few cases this is no doubt due to the weak muscular contraction and imperfect action of the parts above, so that too small a quantity is sent down to the rectum to excite that part of the tube to sufficiently vigorous contractile action. As regards efficient action, a good deal usually depends upon the rectal contents. If a person lives upon highly nutritious diet, such as very strong soup or potted meat, he may find that his bowels will soon get obstinately constipated. If now he adds to this highly nutritive diet a quantity of amylaceous and soft fibro-cellular vegetable matter, which in itself possesses very little nutritive value, and of which comparatively little may be absorbed, he will find that the bulk of excrementitious material will be augmented and the action of the bowels will become more satisfactory.

In fact, if we are to be in good health, we have to take a certain quantity of material with the food which is not in any way of use to the nutritive operations. The proportion of nutriment in bread and potatoes is small as compared with that existing in fat meat. To obtain an equal amount of nutritious matter a comparatively large quantity of bread must be taken, and of potatoes many pounds daily must be swallowed, if that is the only article of diet. Up to a certain point the admixture with the really nutritive materials of a large amount of innutritious dross is advantageous, and even in the case of vegetable feeders this matter has to be considered. A horse does not do so well upon pure corn as upon corn and hay. Chaff is of far more value than you would be led to suppose from its chemical constituents. Many of us indeed require a certain amount of chaff to keep ourselves in fair health. Brown bread is very dear, because it contains so much valueless material, and is a rougher kind of bread than white bread. If you examine brown bread, you will find that it contains a large percentage of the testa of the wheat, which is quite indigestible. Oatmeal is useful in the same way. All these things help to increase the bulk of the evacuation, and in this respect are of great use and do good. Unless there is a certain bulk to excite the fine nerve network of the mucous membrane of the intestine, the reflex action upon which the expelling action of the muscular fibres entirely depends, is not brought about, or is only very feebly and inadequately performed. If the formation of fecal matter is insufficient, or if the evacuation of the larger bowel is not properly performed, many of the most important functions of the organism get out of order. You will find that people who suffer from habitual constipation, and those who have a regular but quantitatively deficient action, complain of certain unpleasant sensations. Although there is no

organic disease, and if you examined every part of such person you would not find the least indication of the slightest structural change, the almost constant discomfort many of these people have to endure is really great; and not only so, but various more or less serious conditions may result from habitual constipation. In this way that unpleasant condition known as Hypochondriasis in the male, and as a form of Hysteria in the female, very often commences. There is even the possibility that a condition of disease bordering upon insanity may be brought about by long-continued improper action of the bowels. Patients will often come to you complaining of very great discomfort. They tell you they feel more or less oppressed, and heavy and overwhelmed; some complain of an unpleasant sensation all over the surface of the abdomen; and when they have taken food, instead of gradually disappearing, it seems as if it went on accumulating and distending the stomach; the patient is blown up with wind; and many persons who suffer in this way soon lose their healthy complexion and become more or less sallow and pasty. Indeed, it is quite extraordinary how many different derangements of the health may result from imperfect action or a torpid state of the secreting and expelling structures of the large bowel. Imperfect action of the descending colon may cause violent and persistent nerve pains referred to the back or hip or groin. Certain forms of sciatica are due to this cause; violent lumbar pain is also not unfrequently caused by sluggish action of this part of the alimentary canal.

There are many craftsmen peculiarly subject to constipation; shoemakers, for example, suffer greatly. Undoubtedly many of them live to get old, and most of them are extremely intelligent, thoughtful people, but, nevertheless, they do not pay attention to the action of the colon. Literary men, teachers, male and female, professional men

generally, who take little exercise, more especially if they live and work in small, badly ventilated rooms, are great sufferers. You seldom see a shoemaker or a tailor with a good color; and the same remark applies to many more whose habits are too sedentary. But, nevertheless, pasty, sallow complexions are often associated with high mental endowments, such as intelligence, energy, patience, and endurance. Organisms of this class have great resisting capacity, and often live to be old. Many are excellent lives to insure. Such persons may suffer much, and, in consequence, are often far from happy and contented. They are, perhaps, very despondent or excessively irritable, and are not always the most pleasant companions. Some of them who are unfortunate enough not to have to work for their living spend too much time in thinking of themselves, their aches and pains; they often complain of slight nausea, and of some discomfort about the stomach; a sense of fulness of the head, and an indescribable feeling of depression, which is sometimes complained of as being so severe as to render them almost unable to control their actions. Persons who suffer from constipation get very tired after slight exertion, or feel tired without having exerted themselves at all. They tell you they are unable to walk; or, if they walk a little way, they get so tired and exhausted that they are obliged to come back and lie down. Very commonly, as I have mentioned, there is uneasiness, and not unfrequently actual pain. Almost invariably in this disorder there is a feeling of lassitude, an indescribable malaise, a disinclination to exertion of every kind, and frequently the patient is discontented with the condition in which he happens to be placed, though the discontent is shown rather by frequent grumbling than by any active attempts to alter it. He does not make any effort to place himself elsewhere, in order that he may be better pleased and happier. The

only way to increase the happiness of such people, or to diminish their misery, is to allow them to growl, and then try to persuade them to take steps to relieve the troubles from which they suffer, and in this effort you will generally meet with at least partial success. They perhaps find fault with you and with everybody about them. You may meet with individuals belonging to this class who seem inclined to pick small quarrels with almost any one, and cannot, or will not, control their discontent. Successful critics are often of this disposition, and many a severe article would never have seen the light if the critic's large bowel had been in good order at the time. So that this troublesome ailment has its advantages, and brings profit to editors, proprietors, and that large and important section of a civilized community whose duty it is to find fault, and whose privilege it is to revile. Any of you who desire to excel in this department of literature cannot do better than cultivate indigestion and other derangements of the bowels, and do all you can to bring about a condition to which I shall presently have to refer, under the head of biliousness. A constipated, bilious dyspeptic is the person soon to become a first-class critic, whose articles are to command high remuneration, and be read by every one.

Piles or Hæmorrhoids.—In many instances constipation is associated with *piles* or *hæmorrhoids* (αἷμα, blood, ῥέω, to flow), as they are termed, which consist of troublesome little nodules about the orifice of the anus. Sometimes pendulous papillæ form on the mucous membrane, half an inch or more above the orifice. These *internal piles* gradually enlarge and give rise to pain and inconvenience. Each includes one or more loops of vein, with a number of dilated capillaries. They frequently bleed, and sometimes a considerable quantity of blood may be lost in this way. An ordinary pile or hæmorrhoid is a small growth, which

may vary much in shape, but which depends from the general surface. The subcutaneous or submucous areolar tissue is thickened, and the small vessels dilated. Little irregular varicose dilatations of the veins can be seen in well-prepared sections, and the outer coat of the vein is more or less thickened from successive attacks of inflammation. Dilated veins of the mucous membrane or skin near or above the anus often exist around and between the actual hæmorrhoidal swellings. Sometimes the pile consists of spongy tissue, almost like that of the placenta, and undergoes great alteration in volume, like an erectile tissue. There may be a number of small hæmorrhoids around or within the anus, each gradually increasing in size until it is as large as the top of the finger, when great inconvenience may result. Walking is accompanied by much suffering, and every now and then the vessels become more congested and the swelling increases in size. The tissues around the dilated vein become inflamed, and severe pain, necessitating complete rest in the recumbent posture for a time, is the result. Gradually this inflammation ceases. The swelling subsides again to its usual dimensions, and perhaps some time may pass before another acute attack comes on.

A pile or hæmorrhoid which once attains the size of a pea is seldom cured without removal. A little surgical operation is necessary, and then the patient goes on perhaps perfectly well for the rest of his life. In a great many instances, at any rate, there is reason to think the development of piles might be prevented if the bowels could be made to act pretty freely and the intestinal canal kept in a healthy state. You may often prevent them from enlarging rapidly and giving trouble, by making the patient frequently take moderate laxatives and attend carefully to his diet. An astringent ointment, like the old compound gall ointment, *Unguentum Gallæ Compositum*, applied at night,

is certainly useful in the early stage of formation. Attacks of congestion, and the accumulation of blood in the vessels, which are productive of severe pain, may often be prevented, or if not very severe, at once relieved by proper treatment, particularly by paying attention to the action of the liver and bowels.

Primarily the condition is probably due partly to original weakness of vessels and to a relaxed state of tissues, to the so-called scrofulous diathesis, in which too rapid formation and imperfect hardening and condensation of tissue is observed, and partly to an altered state of blood unfavorable to the formation of healthy texture having the due property of resistance. The dilatation and other changes in the coats of the vessels are not necessarily restricted to the hæmorrhoidal veins, but may affect other parts of the venous system. Want of exercise, defective oxygenation, and generally the state of blood favorable to the development of the gouty and a certain form of the rheumatic state, seem to predispose to the formation of "piles" in various parts of the superficial venous system.

In constipation or imperfect action of the bowels, the vessels of the walls of the intestinal canal are generally distended, the circulation is more or less interfered with, the capillaries almost constantly unduly distended with blood, and the capillary circulation slow and impeded. The blood accumulates in the veins which unite to form the large portal vein. The flow of blood through the liver is affected, and the portal capillaries in the lobule become turgid with blood, and the action of the liver itself may be much disturbed. The undue tension of the walls of the portal vessels is oftentimes much relieved by osmose of fluid into the intestinal canal, as occurs in diarrhœa, or after the administration of certain purgatives; and if at the same time very little food is taken, so as to allow the organs loaded with

inspissated blood to rest for awhile, complete recovery may take place. The blood, and through the blood the various tissues and organs, may soon regain their normal condition. Sometimes, as I have said, relief is afforded by actual hæmorrhage from the distended veins, and occasionally the capillaries of the surface or the mucous membrane give way, and thus tension is relieved.

Among the many proximate causes of hæmorrhoids, I believe congestion or impeded circulation of the blood in the portal capillaries of the liver is not an uncommon one. In many persons the liver often seems to act sluggishly, and for days together the circulation through it is much impeded. The whole organ temporarily increases in size in consequence of its vessels being distended with blood. The practitioner under these circumstances directs his attention to relieving the congestion and increasing the action of the liver, as I shall describe further on.

Influence of the Reabsorption of Fluid by the Intestinal Surface in causing Constipation.—In many cases of constipation you find that the fecal matter is too dry to pass freely along its wonted channel. It would seem that in many persons there is a too rapid absorption of fluid by the intestinal surface. If the vessels of the large intestine take up too much of the fluid which is associated with the fecal matter, the bulk is necessarily much reduced, and the peristaltic action of the bowels is not so readily excited, and may be insufficient to drive on the contents fast enough.

The consistence of the excrement is no doubt a matter of some importance as regards the action of the large bowel and the process of defecation. In different animals the character of the fæces varies greatly, and we meet with every degree of difference from the extreme of dryness and firmness to the very opposite condition. For example, the

fæces of the rabbit are hard, and are almost dry before they are expelled from the bowel. The same, too, is the case with regard to the sheep. But in many other vegetable feeders the contents of the large intestine, instead of becoming inspissated before their expulsion, are very generally diluted with water. The fæces of oxen contain a large quantity of water, while those of the horse contain comparatively little. Such facts are fully (?) explained by evolutionists, who account for them by the "laws" of evolution and those which govern the correlation of secretion, excretion, and growth.

The too rapid absorption of fluid should doubtless be regarded as one of the circumstances concerned in the production of constipation. But the quantity of liquid taken into the organism may be defective, and the undue inspissation dependent upon deficiency of fluid instead of reabsorption. Some persons habitually take too much fluid, others too little. In the last the fluid part of the blood is probably too highly concentrated for the quick removal of many of its constituents by secreting cells engaged in the process and for the occurrence of the various chemical changes with due rapidity. In this case many of the secretions of the body are formed in too large a quantity, and in too great a degree of concentration, to be dissolved and washed away by the amount of water present.

Constipation which has lasted for some time, as I have already remarked, may lead to the accumulation in the blood of various constituents, out of which fecal matter is ordinarily formed. These not being removed, accumulate in the blood, causing disturbance in many of the physiological actions. Derangement of the general health of the organism follows as a consequence. There may be suppression as regards the formation of excrementitious matters,

or of the substances out of which these are elaborated by gland-bioplasm agency, as well as mere retention or accumulation of these after they have been fully formed.

After a person has been living a long while in town, in close rooms, and too much indoors, taking too little muscular exercise, and especially if he has been in the habit of eating too much, it may happen that the blood has been but imperfectly aerated, and the chemical changes which end in the production of compounds to be separated by various glands, and at last removed altogether from the organism, have not taken place at the proper rate nor to the full extent that is desirable. The excretory processes may have been for a long while only imperfectly performed, and in consequence many of the physiological actions impaired for the time. Much matter which ought to have been removed has accumulated in the blood and tissues of the system, and may have done harm to tissues and organs. In this reduced action of the excreting apparatus the intestinal glands participate. Too little fecal matter is formed, and of the amount formed only a portion is expelled on account of the sluggish state of the nerves and muscles of the bowels. Moreover, reabsorption of fluid from the large intestine proceeds, and the materials taken up add to the accumulation of excrementitious matters in the blood, the serum of which is in consequence changed in its color and composition. The general health soon suffers, the clear florid complexion of health disappears, and the patient becomes sallow, the color of the skin generally being dull, the capillary circulation through the tissues miserably sluggish, the intellect dull. There is an indisposition to exertion of every kind, and the nervous and muscular systems do not act or respond to a stimulus as vigorously and as quickly as they ought to do. People suffering thus may go on with their work, and as a fact numbers do so—but they work, as it

were, against the grain and as though they were heavily weighted.

If, now, for a time the conditions of existence be modified, it is wonderful what a change takes place. Perhaps for the first few days, even in the best of climates and amid the most beautiful scenery, the interest cannot be excited or the despondency shaken off. Sleep is not sound and on rising in the morning the patient is not refreshed. The muscles of many parts of the body ache, some, and particularly those in the front of the leg, feel sore, and after walking ache much, or are actually painful. The patient is conscious of a certain stiffness in his movements, and generally the elasticity both of mind and body is for the time impaired. But, before long, a change takes place. The appetite improves and the sensation of hunger returns. Towards evening a tired feeling is experienced, soon succeeded by a desire for rest. Many hours of sound refreshing sleep succeed and the patient gets up a different man. His spirits rise, he is seized with a desire to walk, to do, to see. The mental and bodily lassitude no longer trouble him. The complexion becomes ruddy, the skin smooth, and moist, and healthy. The bowels begin to act freely, and in three or four days the excretory glands separate from the blood and the excretory channels discharge in twenty-four hours more than had previously been removed in a week. In this way the blood is depurated and changed for the better, and I have no doubt that, at least in many cases, the improvement in mental action is consequent upon the restoration of the blood to its normal healthy state. There is another fact which may be adduced in favor of the conclusion that in constipation, or imperfect action of the bowels, the blood becomes altered in character. If you happen to have any little scratch or abrasion on any part of the body, it will look more or less "angry" if the excretory

processes should not be going on freely, and wounds will not heal. Instead of healing in the course of twenty-four hours, a scratch will discharge liquor sanguinis from its surface. Healing under these circumstances goes on very slowly, if, indeed, the process is not altogether entirely interfered with for a time. Or, if you should be troubled with any little cracks about the margin of the mouth, you will find that they will gape and give you pain. They will not heal but will remain open for several days, until free action of the bowels occurs, and then they soon improve and gradually get well. This angry state of scratches, or wounds, or little cracks or sores on the lips or margin of the tongue, depends, I think, upon an altered state of the blood which is gradually brought about by constipation.

There is yet another matter to which I must direct your attention, because it is of the greatest importance in connection with the views I have advanced concerning the state of the blood in these cases. You will often meet with cases in which, a few hours after a surgical operation, the temperature of the blood rises, and the patient becomes feverish. The temperature may rise three or four degrees and his pulse increase in frequency. There may be some wandering at night or actual delirium with a hot dry skin, and indeed the patient's state may be such as to cause his attendant considerable anxiety. The surgeon examines the wound and finds that instead of progressing favorably, it looks more or less angry, and the discharge on its surface is changed in character, losing its viscidity and becoming thin and watery, with perhaps a little softened and discolored broken-down blood-clot mixed with it. Now if when things are in this state you give a purgative which will act freely upon the bowels, you will perhaps find that within four hours after the purgative has been taken, and before it acts, all the grave symptoms are mitigated, and the patient

from that moment will progress favorably. I have many times watched with great interest the fall in temperature in such cases—a fall of some three or four degrees of Fahrenheit's scale in the course of a few hours, from the action of a purgative.

Phenomena of the same general nature may be very frequently observed in young children. Many very troublesome ailments occurring in childhood are due solely to the imperfect action of the bowels. Oftentimes, when you get into practice, you will be called to see a child who seems extremely ill, irritable, sleepless, feverish, wandering somewhat and screaming at night, perhaps even delirious, causing great anxiety to the parents. And yet all these untoward symptoms will very probably be completely relieved as soon as the bowels have been made to act freely.

The facts I have just briefly reviewed prove conclusively to my mind that the imperfect action of the large bowel may derange some of the most important physiological changes going on in the system, and disturb some of the most important organic actions. By affecting the composition of the blood, constipation may occasion derangement in the action of many secreting organs and seriously interfere with the due performance of many of the most important nerve organs.

Further you will find that the particular remedies which act most advantageously in these cases of derangement, depending upon constipation or imperfect muscular and excretory action of the bowels, are those which possess the special property of exciting various secreting organs of the body to increased action. Among these perhaps the most useful are preparations of mercury, though sudorifics and diuretics not unfrequently exert a beneficial effect without any purgation whatever being produced. And this fact you will not fail to acknowledge also supports the view that the compo-

sition of the blood is modified by persistent constipation, that in fact excrementitious matters which ought to be quickly excreted, accumulate in it, that nutritive operations are in consequence deranged, and lastly that the blood can be brought back to its normal state and health restored, by the action of those remedies which have the property of exciting the excreting action of the glands of the intestine and other parts to act very freely, and thus eliminate from the blood the accumulation of deleterious excrementitious matters.

Constipation with Impaction of Fecal Matter in the Large Intestine.—In old age it is of the utmost importance to prevent constipation; for it may lead to very serious trouble. As the tissues get old their action becomes less vigorous, and the nerves respond more and more slowly and less readily to their wonted stimulus. The muscular fibres become weak and lose much of their contractile power. Particularly the muscular tissue of the large intestine, like that of the bladder, becomes more or less feeble, and the viscus is unable to expel its contents. Some artificial stimulus is required from time to time in order to excite the weakened muscular fibres to contract with sufficient vigor to cause the bowel to empty itself.

In old age an accumulation of fecal matter very often goes on for a long period of time. It occurs so gradually that the patient is not conscious of it. By putting your hand over the belly, and particularly over those parts in which you know the large bowel is situated, you may often feel the colon for a considerable portion of its extent much distended by an accumulation of hard fecal matter. At the same time you may ascertain whether there is also wind in the large bowel. If you place one or two fingers of one hand over the surface and strike the back of one finger sharply with the tip of the middle finger of the other hand,

you will be able to decide at once according to the note elicited by percussion. A dull sound indicates solid matter, while a hollow drumlike note (tympanitic) indicates air in the bowel beneath.

Sometimes the accumulation of fecal matter in the large intestine is so considerable that the bowel becomes almost paralyzed, and the individual cannot expel anything by the strongest efforts he can make. Under these circumstances you may inject some gruel, or plain water, or soap and water, or castor oil and soap and water into the bowel, and in considerable quantity, without succeeding in exciting reflex action. The fæces remain as it were impacted, and cannot be dislodged by such means. This condition is sometimes spoken of as *impaction*. You may occasionally find the lower part of the large bowel of an old person so full and choked by impacted fecal matter that it overflows as it were, although there is not the slightest effort on the part of the bowel to empty itself.

As the bowel does not contract, and has indeed nearly lost its contractile power, the fecal accumulation must be removed. A sort of scoop, or paper knife, or the handle of a spoon, or any other convenient instrument of the proper shape, and with rounded edges so as not to cut the parts, may be used to remove the hard fecal matter. The operation is always a disagreeable one, and sometimes it is very difficult to carry out, but it must be undertaken, and we must be prepared to interfere in this way many times in the course of our practice. Those of you who may by-and-by be engaged in country practice, are sure to meet with such cases from time to time, particularly amongst the inmates of asylums for the aged and in poorhouses, and you must be ready to afford the only relief that is possible.

Constipation has caused death. I have myself seen such a case. I recollect an old lady who had been bedridden

for years, and was in fact dying when she came under my observation, whose abdomen had increased to an enormous size. To my great astonishment, when I came to examine it I found the swelling due to an enormous accumulation of hard fecal matter. There was no fluid, and very little gas; but the whole abdomen seemed occupied by a huge mass of hardened fæces—I should think amounting in weight to 30 or 40 pounds. Unfortunately I only saw the patient a few hours before death, when she was reduced to the last state of exhaustion, and when it was impossible to interfere. In this case fæces had probably been gradually accumulating in the intestines without attracting notice. The patient being bedridden the circumstance seems to have escaped observation. Probably if a medical practitioner had been allowed to interfere some six months before, the patient might have been saved. Injections might have been given, and the contents of the bowel thus removed before any harm to it had resulted.

OF THE TREATMENT OF CONSTIPATION.

Of the Action of Enemata.—You must not forget that, as was shown by Marshall Hall, defecation is a reflex action, and is dependent upon the contraction of the muscular fibres caused by efferent nerve-fibres emerging from the nerve-centre which receives the sensitive or afferent nerve-fibres formed by the convergence of branches from a network spread out upon the mucous membrane of the large bowel. The excitation beginning in the peripheral nerves of the mucous membrane being carried to the nerve-centre by the afferent fibres, changes are produced in the centre which result in the transmission of an impulse to movement being conducted by efferent fibres and muscular contraction. The afferent nerves in the mucous membrane,

like many special fibres in other parts, seem to be generally in a quiescent state. They do not instantly respond, like certain other nerve-fibres, as for example those spread out on the conjunctiva, to any very slight stimulus, but decided and somewhat prolonged pressure or other form of irritation is necessary to throw them into full action. In many cases of constipation, the ordinary stimulus of the fecal matter present is not sufficient, and if contraction is to be produced, additional excitation must be brought about. It is upon this principle that the practice of introducing enemata into the rectum is founded. Fluid is gradually injected, and in this way the contents of the lower part of the bowel are much increased, until having reached a certain volume, powerful reflex action occurs, and fæces and injection are forcibly expelled together. Do not, however, suppose that the response takes place immediately. A certain interval, perhaps five or ten minutes or a quarter of an hour, may elapse before the bowel contracts, and generally it is better that the contraction should not occur too quickly, or only partial expulsion will result.

In administering an injection you should direct that the fluid should be introduced very slowly, the operator stopping for a time whenever the patient feels contraction coming on. If the bowel is only gradually distended, you will often find that a pint and a half or more may be introduced before reflex action is excited. This simple operation, which is known as giving a *Clyster*, or *Injection*, or *Lavement*, is a practice which is very commonly adopted, and some people are in the habit of resorting to it very frequently. Some of the French ladies I am told never get an action without injecting water into the bowel, and have to carry out the practice daily or every other day. The lavement is an efficient but rather troublesome measure to resort to

daily, and probably few English people could be persuaded to take so much trouble.

Purgative Enemata.—Instead of injecting ordinary water, you may employ water containing various purgative medicines, such as *Colocynth*, *Aloes*, *Castor Oil*, or some others dissolved or suspended in weak gruel or in *Soap and Water.*

The Hygienic and Dietetic Treatment of Constipation.

There are certain methods of treating ordinary constipation with which every one should be acquainted. Some of these are preventive, and by having recourse to them many who have suffered may not only obtain relief, but may discover how to prevent the recurrence of the troublesome affection.

Exercise, we are often told, is a great preventive of constipation, and sometimes will cure it when established. Many practitioners are very confident on this point, and invariably assure those who suffer that if only they will take sufficient exercise, they will be cured. Some obedient patients at once adopt the system of a regular constitutional. But here and there the plan completely fails. A man regularly walks his six or seven miles or more daily, but so far from his constipation being cured he finds it worse than before. Exercise, it is perfectly true, is advantageous within a certain limit. But if a person takes too much exercise he may actually encourage this form of derangement instead of curing it. Nor is walking exercise so necessary or advantageous to all as is generally supposed. Individuals differ from one another extremely in this respect. One cannot keep himself in health without his long daily walk, while another enjoys excellent health though he may not walk a mile a week. Not only so, but it is a fact that many persons who have taken no walking exercise whatever at any

period of life, have nevertheless enjoyed excellent health and have lived to be very old. In advocating exercise in constipation and in other slight ailments, you must be careful in the case of those who have not been accustomed to long walks, to recommend moderate distances, and at a quiet pace. Two or three miles a day will probably be enough for most persons. The man who is engaged in hard intellectual work will, as a rule, require little exercise. During a holiday you may with advantage engage in a greater amount of muscular labor than you could beneficially perform if you were studying hard. And I have known several instances of persons getting thoroughly out of health from acting upon the mistaken notion that much exercise is required at the same time that intellectual work is carried on. In general, when you are working for an examination, and reading several hours day after day, you will find that a gentle walk of an hour or so in the afternoon, or mere moving about in the open air for one or two hours will be more conducive to your progress than a long walk. Fast walking, running, and all violent athletic exercise should, like dinners and high living generally, be avoided by those who are preparing themselves for examination.

The cold bath is commonly stated to be of great use in the treatment of constipation. People say that if you indulge in cold tub every morning, the bowels will act properly and without artificial help of any kind. This system again is excellent for some, but the daily use of cold water will not suit all equally well. With some persons it disagrees and causes them to feel chilly and very uncomfortable. On cold foggy mornings at this time of the year (November) it requires some strength of mind to cover oneself with cold water just after turning out of a warm bed. Still many Englishmen assure us that it not only suits them but affords

them delight and keen enjoyment. Those with whom the cold bath agrees experience a pleasant glow all over the body, and feel warm and in good spirits. When this is the case you may advise that the cold bath should be continued. But if, on the other hand, the patient feels chilly, miserable, and uncomfortable, with slight headache and chilliness of hands and feet, and especially if his skin becomes cold and bluish, and he comes down to breakfast without an appetite, you should tell him that cold water in the early morning is not suitable for him, and suggest that he should take his bath tepid or even warm.

Rubbing.—Another good general remedy, and one that is not open to any objection, is rubbing. I believe this method is very little employed, and that its value is much underrated. There are many who, if instead of taking a cold bath would simply rub themselves well with a rough towel, using strong muscular efforts in doing so, would find a gentle glow come over the skin, and experience a far more comfortable sensation than is afforded by a cold bath, while an equal amount of old epithelium would be removed from the cuticular surface.

Moist Applications to the Abdomen.—Persons who suffer from torpid bowels are often much relieved by the application of a wet compress to the stomach. This is a very old remedy. You may apply a moist rag or towel, folded into four, to the surface of the belly, or a piece of moistened spongio-piline may be used. It matters not whether the water be cold, tepid, or warm. If applied cold it soon becomes warm, and I am not aware that any benefit results from the, to many persons, very unpleasant application of a cold rag to the warm skin. Care must be taken that the compress or other application is not too wet when applied. It may be worn for two or three hours daily, and in this

way relief is often obtained, without the use of any medicine whatever.

Of Kneading the Bowels.—Another very simple way of assisting the action of the large bowel is to press or knead the abdomen with the hands. Any one can do this for himself. The two hands should be moved upwards and downwards over the surface of the belly, and the large bowel pressed backwards in different places. Those who have studied anatomy know the course taken by the colon, and should press or knead it in a direction from its commencement in the cæcum in the right iliac region upwards, and across the upper part of the belly to the left, and then downwards, following the course taken by the *ascending, transverse, and descending colon,* and towards its termination, in the rectum. This kneading encourages the contraction of the large bowel, and is certainly in many cases very useful.

Diet.—There can be no doubt that diet has very much to do with the regular and efficient action of the bowels. A liberal allowance of meat and a too highly nutritious diet, favor constipation. On the other hand, various kinds of fruit and many soft vegetables tend to prevent and relieve constipation.

Bread.—The bread that we eat should not be made of very fine white flour, from which all the bran has been carefully separated, and with which a certain proportion of alum—itself possessing astringent and constipating properties—has been added, to make it appear perfectly white. The best bread for keeping us in health is not the whitest. As regards pleasant taste and nutritive qualities, the sort of bread you eat at farmhouses, and which is by no means white, is much to be preferred. *Brown bread,* such as we get in London, is very good, but it ought to be made of coarse flour, from which the branny particles have not been separated. I fancy, however, that a good deal of brown bread is made by adding

coarse particles of bran to ordinary flour. Brown bread taken from time to time will certainly help to excite the action of the bowels.

Oatmeal, again, is another good and very desirable kind of food. It is taken by many, particularly by Scotch people, who well understand how to live cheaply. The best oatmeal is the Scotch, and may be cooked in many ways. It may be made into "stirabout," and milk may be added; or it may be formed into thin cakes, which can be dried. These may be toasted when required, and eaten with butter. Oatmeal sometimes proves to be a good remedy for certain forms of constipation. It contains many nutritious substances. In it all matters required to form the staple of ordinary diet are found, and it is a good substitute for bread. Some persons, however, dislike it, and with some it disagrees.

Coffee.—A small cup of sweetened black coffee (*Café noir*) before rising sometimes acts as a purgative.

Fruit.—There can be no doubt that fruit is a very useful article of diet. This will be freely acknowledged, but many are unable to indulge in fruit in the winter season. In a climate like this, except for a very short period in the height of summer, fruit is a rather expensive luxury. However, though few can afford to obtain as much fresh fruit as they could eat, very good substitutes are within the reach of all, even the poor, though few English people take advantage of the opportunity they enjoy in being able to purchase excellent dried fruit at a very cheap rate. Oranges and lemons are also to be had during many months.

French Prunes and Normandy Pippins.—Prunes may be bought for fourpence a pound, and a pound of prunes will last for many days. If properly prepared, cooked prunes are very good. The French and the Germans use prunes very generally. They stew them and add some syrup, and

eat them with the meat at dinner almost daily. If you determine to try them, you may have to turn cook for a time, for you will find many British cooks indisposed to follow your directions. Should the cook be exceptionally amiable and willing to learn, you may suggest to her some such plan of proceeding as the following: The prunes may be soaked in cold water for several hours, perhaps twelve hours or longer. When they are found to have swollen up, and to have become quite soft, in consequence of imbibing much cold water, they may be stewed in the ordinary way, and sugar added. If properly cooked, they will be perfectly soft and of a very pleasant flavor. In this way you can all provide yourselves with perfectly good fruit all the winter.

Lenitive Electuary (*Confectio sennæ composita*) contains prunes. Although this is a very good purgative, you will find that some people do not like it. Children will often take stewed prunes, although it is a most difficult matter to give them any form of medicine. You may increase the purgative properties of stewed prunes in a very simple way—and the hint I shall give you is a useful one to bear in mind in the management of children. You may suggest that a teaspoonful of *senna leaves* should be tied up in a small muslin bag and soaked for an hour in the water in which a pound of prunes is stewed. In this way you add a little infusion of senna to the prunes, and although you hardly alter their taste, you considerably increase their purgative action.

Dried Apples.—Another fruit you can always get is dried apples. Normandy pippins are ordinarily sold now at all the grocers for a few pence a pound. These you will find to be an agreeable change, now and then, instead of the prunes. They must be soaked in water and then stewed in the ordinary way. A pound of these Normandy pippins will be sufficient for several dishes. You may also recom-

mend French plums, which are nicer than ordinary prunes, but more expensive. Another dried fruit, which is now very cheap and to be obtained in good order all the winter, is the dried fig. Figs are now brought over in large quantities, and are very cheap. The purgative action is increased by soaking in water over night. The fig, in a state of soft pulp, may be eaten on the following morning.

Of Taking Fluid.—The quantity of fluid taken has some influence upon the action of the bowels. Many people are seldom thirsty, and more object, and with good reason, to drinking water. Tea is often objected to on the supposition that it causes indigestion. If alkaline and effervescing waters, and all forms of alcohol, are at the same time denied, the individual will take too little fluid in the twenty-four hours. One cup of tea or a small cup of coffee at breakfast, half a pint of beer in the middle of the day, and perhaps another half a pint of beer, or wine in water at dinner, will scarcely amount to a sufficient quantity of fluid to keep the body in health, especially if the appetite is good and a fair amount of solid food is consumed. Many people who are never thirsty will occasionally suffer from constipation, as well as from other derangements, which will be referred to in their proper place.

When you have reason to think that a patient is suffering in health from taking too little fluid, you may suggest to him the propriety of taking a certain quantity of water at fixed times. You recommend him to drink a glass of ordinary water on rising, another about eleven o'clock, and another at bedtime. Or you may suggest that at dinner he should take hock and seltzer water, and an hour after dinner, or at bedtime, another glass of seltzer or some other effervescing water. In some cases you may recommend cider or perry to be taken at dinner. You may advise that broth should form part of the most important meal of the

day, and generally, you suggest various things—milk, whey, more tea, etc.—with the object of getting more fluid into the body.

In general it does not do to advise the patient to take ordinary water, for, in the first place, few would adopt your prescription, and, secondly, there is the real and serious objection to ordinary water that it may be bad and, though not disagreeable to the taste, may contain typhoid fever or other disease germs. All objections to ordinary water are, however, removed if it be boiled. Some do not object to take warm tea or warm water with their meals, and it suits the stomach far better than cold fluid, which may check digestion. In cold weather I have long been in the habit of taking warm water, and have recommended the practice to others, but many object and prefer to let the water get quite cold before they take it. Householders should make a rule that every morning a kettle of water which has been boiled for ten minutes or longer should be allowed to cool, and then poured on the filter. The boiling renders the water perfectly safe, for it destroys every living organism as well as animal poisons that may be suspended in it.

Most practitioners recommend their patients to drink special aerated waters, and there is no doubt that some of these are more pleasant to take than is ordinary water, but the rapidity with which waters of particular kinds come into favor and are forgotten, and give place to others, is sufficient to show that the water is, after all, the active and efficient ingredient. The patient who goes to some celebrated spa is no skeptic, and according to the instruction he has received from his teacher, attributes the beneficial effects he experiences, not to the ingredients dissolved in the water, but to some mysterious properties which these sub-

stances have somehow acquired as they were dissolved, or while the solution is forced upwards to the surface of the ground. The potash and soda, etc., accordingly are not ordinary potash and soda, with the ordinary properties of the molecules, but are imbued with some very remarkable powers somehow communicated to the molecules in the bowels of the earth. Fashion and caprice sanction and demonstrate the universal healing powers of this or that spring, and then a new fashion decrees its impotence and transfers infallible potencies to some newly discovered water. The self-denying supplicant who determines to devote himself for a few weeks to the worship of Hygeia must turn out at about five A.M., and according to the established rites of the place, may have to walk a certain distance, and drink a definite quantity of water before he is permitted to enjoy the frugal breakfast, at which even butter may be proscribed. More drinking and more walking follow in due course, in obedience to well-defined rules. The simple midday meal is succeeded by more walking and more air and water. Improvement is soon manifested. The bowels act, the appetite returns, the spirits rise, and due credit is given to the mysterious agencies communicated to some of the chemical ingredients of the water during their solution or afterwards. The air, the simple wholesome diet, the substitution of water for alcohol, the exercise, the rest enjoyed, and peace of mind are the mere accidents attending the curative action of the special water. But those who drink good water in London, and live in frugal style, may work hard and yet enjoy all the year round the advantages which some go so far, and at great expense and inconvenience, to seek in what they call their holiday.

Smoking Tobacco.—There are some unfortunate individuals, slaves to a bad habit, who tell you they can never get their bowels to act without smoking the accustomed cigar

or pipe. Whether it be the force of habit, or whether the nicotin, the active principle of the tobacco, actually gets into the blood and excites the bowel to act through the nerve-centres I do not know, but we are often assured that smoking does exert a purgative influence. Tobacco-smoking in moderation certainly does no harm whatever, and he who finds that it is followed by the desirable consequences referred to, will be wise to smoke.

The Medicinal Treatment of Constipation.

Of Purgatives in Constipation.—As I have shown, in cases of prolonged insufficient action of the bowels the general health is impaired, the blood becomes altered in composition, many substances remaining in it, and circulating with it through the vessels, which ought to have been eliminated, and the action of many secreting and other organs is, in consequence, more or less disturbed.

It may be necessary to advise the patient who has been suffering from deranged health, resulting from a prolonged state of constipation, to submit to systematic medical treatment. In some instances the condition may be relieved by attending to the state of the secreting organs without giving any medicines having purgative properties. The character of the urine and other secretions is often much altered. Deposits of considerable quantities of urates are formed, and the urine itself may be of very high specific gravity, and in other respects may have departed, more or less, from the healthy state. In such cases a few doses of Bicarbonate of Potash (*Potassæ Bicarbonas*) will set everything to rights in a day or two, without any purgative action being excited.

In many cases of constipation in which the blood is in such a state that any little wounds or scratches do not quickly heal, an ordinary purgative that acts on the alimentary canal

will not suffice, but you must select one which, besides producing purgation, also acts upon the secreting glands, particularly those which discharge their secretions at once into the alimentary canal. As soon as the medicine begins to act, and that is oftentimes hours before any purgative effect is experienced, the red and angry appearance of the wounds and scratches will subside, and the healing process will be proceeding satisfactorily within twenty-four hours after the dose has been swallowed.

Where constipation has existed for a considerable period of time, and the general health has in consequence become considerably deranged, you must not expect that the patient is to be at once cured, and indeed generally you will find that purgatives administered from time to time, in moderate doses, act more favorably than a smart purge administered once only. Very free purgation is often followed by constipation, and the patient, instead of being permanently benefited, is only relieved for a very few days. You will often find it necessary to give moderate doses of certain purgative medicines at short intervals for a time, taking care, however, not to carry this system too far, so as to worry and irritate the alimentary canal, and giving the patient much pain and discomfort. Again, it not unfrequently happens that an ordinary purgative will not properly act, or it acts only very slightly, without affording the relief which is expected. In such a case it may be advisable to repeat the medicine two or three days running, but sometimes it is better to wait for a few days, and then repeat the dose. The same medicine administered to a person in precisely the same dose will sometimes act freely and sometimes will not act at all. The state of the bowel varies greatly as regards secretion, and its response to stimulants to secretion, and muscular contractility. No doubt this depends to some extent on the appetite, and the kind and

amount of food taken, but not entirely so, for sometimes after a person has lived sparingly for some time, a moderate purge will produce a very free action. The action of the intestinal, like that of other glands, is not uniform within corresponding periods of time, but sometimes it is very free, sometimes almost suspended for awhile. If we can just hit upon the time when the glands are about to act freely, for the administration of the purgative, the effect will be exactly what is desired. Many of these glands form and discharge their secretions, and then rest for awhile. It is, therefore, wrong in principle to be continually trying to excite them to action by giving such remedies as mercury, day after day, for a considerable period. This injudicious and unreasonable practice did weak people a good deal of harm, and to it we are indebted for the present unreasonable opposition to the employment of one of the most valuable medicines known to us. On the other hand, when the constipation depends upon sluggish action of the large bowel only, the daily or almost daily administration of a mild purge, containing rhubarb, aloes, senna, colocynth, or podophyllin is unobjectionable, and by adopting this practice, which has been solemnly condemned by some authorities, you will sometimes enable a patient to get through a great deal of work which otherwise he could not perform, and you will now and then succeed in transforming a thoroughly miserable and discontented man into a happy one. *See* also the remarks on the use of mercury under the "Treatment of Sick-headache."

One is often assured by a patient in answer to inquiries that his bowels are "regular," that is, that an action occurs every day, and he will perhaps tell you that he is quite confident no purgative medicine is required. Although from the first you suspect that he only wants a purge, you try various remedies to relieve the symptoms of which he com-

plains, but without effect. He may go from doctor to doctor, and at last he is ordered to take a purgative and gets almost immediate relief. Oftentimes it is necessary to order a mild purgative pill to be taken daily before dinner, for a week or longer, and the patient is not unfrequently quite astonished at the effect. Up to that time he had felt convinced that his colon was clear, although, in fact, fecal matter had been very gradually accumulating in it for a considerable time.

As regards the doses of purgatives, you must be very careful, for you may order a patient a dose that will certainly clear out the whole intestinal canal, but which will also gripe him very severely, and make him for a time very weak and miserable; while a dose which you might perhaps hardly believe would have any purgative action at all, would have been quite sufficient to effect the desired end, and without producing the slightest pain or discomfort. You must vary the doses of the drugs you prescribe, according to the state of the patient, and according to the sort of organism which you have to treat. If you are prescribing for a highly nervous, anxious, excitable person, who thinks he has got all sorts of ailments of a very serious character, you must, as a rule, not give very violent purgatives, for if you do, you may bring on pain and sickness and much increase the intensity of the suffering you have been asked to alleviate. On the other hand, if you are treating a robust laboring man, accustomed to work hard and feed well, and in the habit of drinking three or four pints of beer a day, and more when he can get it, who has a florid complexion and great muscular vigor, it would be foolish to order him a gentle pill or mild draught. To such a person two or three grains of colocynth pill would be perfectly useless, and ten grains might be required to act at all, and if you were to add to these two or three grains of

calomel, the patient would probably feel the more grateful to you. Many of the chemists, in town and country, sell good strong pills, which they call "Cabmen's Pills" or "Navvys' Pills," and which are most useful to those for whom they are intended, but which would not suit many of your patients. This frequent necessity for varying the doses of medicines according to the individual patient, shows the importance of our learning how to prescribe, and mix, and combine medicines, instead of exclusively relying upon the pills and mixtures made for us in enormous quantities by large firms, and to be bought by the gross and by the gallon, but which cannot be altered to suit individual patients, and combined so as to agree with peculiar temperaments. Moreover, there is no doubt that many extracts and pill-constituents lose much of their virtue by being kept for a considerable time. Practitioners, from time to time, discover certain combinations of things which are very valuable, and the receipt for many a useful pill or mixture has been handed down from generation to generation. In these days, not only do we neglect to use many of the old prescriptions, but we no longer suggest new ones, and many combinations of drugs of tried value and in frequent use in former days will soon be altogether forgotten. The old system of teaching pupils such elementary but practically important matters has been entirely abandoned, and many a wrinkle of the greatest importance in practice, instead of being preserved and transmitted, is lost. Never neglect an opportunity of picking up from old practitioners any receipts for medicines they are willing to give you, and do not despise their teaching, especially as regards the treatment of many slight ailments very difficult to manage and to cure,—or receive with contemptuous indifference their suggestions for the treatment of functional disorders, the exact nature of which they cannot adequately explain.

Castor Oil, Oleum Ricini, which is the oily substance expressed from the seeds of the *Ricinus communis*, is one of the best and most frequently used of purgative medicines, and were it not for its nauseous flavor would be yet more popular. It is at the same time one of the mildest and most certain of purgatives. Castor oil is suitable to persons of all ages. You may give it to the infant as well as to the most infirm and delicate. It is usually given by the mouth. But castor oil may also be employed in enemata. It is one of the few purgatives that act upon every part of the intestinal canal, from the stomach downwards, but its action commences in the upper part, and it is efficient in driving down imperfectly digested and other matter that may be irritating the mucous membrane and causing pain. The dose varies from a few drops to half an ounce or more, but most persons take more castor oil than is really necessary to produce the desired effect. One teaspoonful is often sufficient for an adult and sometimes acts as well as a larger dose. One advantage of prescribing the smallest dose that will be useful is that it is so much easier to take. There are many receipts for taking castor oil so as to avoid tasting it. Upon the whole I think you will find the following one of the most efficient plans. You direct that a teaspoonful or more of "black coffee," that is, coffee without milk, be poured into a wine-glass, the whole of the interior of which, including the lip, is to be well wetted with the coffee. A teaspoonful or a little more of the oil is then to be steadily poured on the surface of the coffee, when it will form a large globule lying perfectly free and not in actual contact with any part of the glass, because the latter has been well wetted with the adhering coffee. The patient then opens his mouth wide and pours the oil and coffee down his throat, swallowing the whole in one gulp. If the operation has been successfully conducted, he will not have

tasted the oil in the slightest degree. Tea, a little ginger or orange wine and water, or peppermint, camphor or orange-flower water, or brandy and water may be used instead,—but strong spirit being lighter than the oil will not do. Some strongly recommend that the dose of castor oil should be well shaken up in a bottle with twice its quantity of milk, and when well incorporated poured into a cup or glass and quickly swallowed.

Rhubarb, Rhei Radix, Pulvis Rhei, is one of the best of purgatives and its virtues are very widely known. It has been a popular remedy for more than two centuries, and is one of the best purgatives for children. Mixed with carbonate of soda, *Sodæ bicarbonas*, it is very useful in derangements of digestion. From five to twenty grains of rhubarb with twice as much bicarbonate of soda, will often give great relief. The dose may be repeated once every other day after food for a week or two in cases of constipation or imperfect action of the bowels. See also pp. 163, 164.

Pulvis Rhei Compositus, formerly known as *Gregory's Powder*, consists of rhubarb, 2; light magnesia, 6; and powdered ginger, 1. It is an excellent and safe remedy and may be given in doses of from ten grains to a drachm, in water.

Ordinary Compound Rhubarb Pill, Pilula Rhei Composita, and Compound Colocynth Pill, Pilula Colocynthidis Composita, suit most persons very well. You may order three to eight grains of either of these pills, and it is better to combine with them a grain or two of the extract of Hyoscyamus or Henbane, *Extractum Hyoscyami*, which will prevent any griping or discomfort. Three or four grains of either of the above pills with a grain of extract of Henbane may be made into a pill and one may be taken every night or every other night for a week or two, in many cases, with great advan-

tage. In this way the bowels may be thoroughly relieved and got into the way of working regularly.

One of the great advantages of giving purgative medicines in the form of pills is that the particles are thoroughly comminuted and diluted as it were, by less active ingredients. The importance of the minute division of active substances was known even to the ancients. A smaller quantity of the active material is sufficient, and it is far less likely to do harm, while its action is sure to be more moderate and equable, if intimately mixed with a quantity of inert or slightly active material than if administered in a pure state. Many pills and powders have been compounded on this principle. Compound ipecacuanha powder, *Pulvis Ipecacuanhæ Compositus*, Compound Jalap powder, *Pulvis Jalapæ Compositus*, and Compound Rhubarb powder, *Pulvis Rhei Compositus*, are examples. If there be much flatulence, or if you desire to give a little stimulus to the secretion of the gastric juice, you may add to the pill or pills half a grain or a grain of Capsicum, *Capsici Fructus*, or ordinary Cayenne Pepper, with great advantage.

You must recollect in administering pills not to order more than five, or at the most six grains in one pill, or you will astonish your patient by the size of the bolus you have ordered him to take. Five grains form a moderate-sized pill, but if blue pill or calomel should be one of the ingredients, the pill will be small, because a grain of these mercurial preparations occupies very little space. This matter of the size of pills must be borne in mind, for some people think it an insult to receive a large pill, and many will tell you they cannot swallow one of even moderate size. The professed inability to swallow a pill is often mere affectation or determination on the part of the patient not to attempt to do so; but some persons have a real difficulty. For them the pill may be silvered or gilt or covered with a taseless

starch coating, and if neither of these plans will please, tell them to pack the pill up in a small piece of moistened "pastry-cook's paper," when the whole will slip down whether the patient will swallow it or not. This pastry-cook's paper can now be obtained at many of the large chemists, and is an excellent thing in which to give powders to children.

Nux Vomica is another remedy which may be given, by itself or combined with a purgative, in cases of imperfect action of the bowels. It is useful by giving tone to the bowel and stimulating, probably through its action on the nerves, the contractile action of the muscular coat of the intestine. It is now frequently prescribed. It comes from the plant which yields Strychnine, *Strychnos Nux Vomica*. You may give of the Extract of Nux Vomica, *Extractum Nucis Vomicæ*, from a quarter of a grain to a grain. If added to a purgative pill, it helps the action of the large bowel. The Tincture of Nux Vomica, *Tinctura Nucis Vomicæ*, in doses of from ten to twenty minims with some compound. Decoction of Aloes, *Decoctum Aloes Compositum*, or some other purgative mixture, is also useful.

Scammony, *Scammonium*, a gum resin from the root of Convolvulus Scammonia, is a component of many purgative pills and a very active purgative. For children suffering from intestinal worms Scammony is one of the best remedies. It may be given in doses of one or two grains, or from three to five grains of the Compound Scammony Powder, *Pulvis Scammoniæ Compositus*, which consists of Scammony, 4; Jalap, 3; and Ginger, 1, may be ordered instead of the pure drug. It may be taken in a little milk. Probably many patent purgative medicines contain Scammony. It is a rather searching purgative, which clears out the bowel well, expelling any hardened fæces and wind that may have collected.

Compound Liquorice Powder is now in the Pharmacopœia. The preparation is much used in Germany and Russia, and is certainly one of the best and safest of ordinary purgative medicines. The *Pulvis Glycyrrhizæ Compositus* of the British Pharmacopœia contains two ounces of finely powdered Senna and the same quantity of powdered Liquorice root, with six ounces of powdered sugar; but the German preparation is made as follows: "Powdered Senna, powdered Liquorice, of each, 2; powdered Fennel, Sulphur, of each, 1; white sugar, 6; mix."—*Squire's Companion to the British Pharmacopœia.* The dose of the powder is a teaspoonful, carefully mixed in a little water.

Aloes is another purgative which has the property of acting upon the large bowel. It probably irritates the mucous membrane, and excites its glands to secrete; but it also, by reflex nervous action, stimulates the action of the muscular coat of the intestine, and excites vigorous contraction both of the circular and longitudinal muscular fibres. It is a very good purgative to give in cases of torpid bowels, but it is important for you to bear in mind that aloes has the effect in some cases of encouraging the formation or increase of hæmorrhoids or piles; see p. 129. It seems to irritate the mucous membrane of the lower bowel, and those who suffer from an irritable state of this part sometimes find their sufferings much increased if they take any of the ordinary preparations of aloes. There is the Socotrine Aloes, *Aloe Socotrina*, and Barbadoes Aloes, *Aloe Barbadensis.* The Compound Decoction of Aloes, *Decoctum Aloes Compositum*, is ordered to be made of Socotrine Aloes, and contains besides, Myrrh, Saffron, Carbonate of Potash, Liquorice, Compound Tincture of Cardamoms, and Distilled Water. This is a very valuable preparation, and enters into the composition of many favorite draughts which used to be prescribed in former days, and which brought

gain to the apothecaries of old. That once very fashionable but rather nasty dose called a *Black Draught* was composed of Decoction of Aloes, with Sulphate of Magnesia, Senna, and Liquorice. Its composition was modified by different authorities, and some improvements, more nasty still, were made by ingenious physicmongers; but the reputation of the black draught is gone, and though an excellent purgative, is seldom prescribed in these days. Forty years ago Dr. Chambers, who was then the fashionable physician in London, and other physicians almost as fashionable, prescribed blue pills and black draughts for most ailments. It would not be easy now to persuade people to swallow a black draught. However, with a little ingenuity you may make something less nauseous and equally efficacious. The decoction itself may be taken in doses of from two drachms to an ounce and a half or more.

Probably the best preparation of aloes, to prescribe in the form of pills, is the watery extract of aloes (*Extractum Aloes Socotrina*). This watery extract does not irritate the bowels, and acts very effectually. It may be given in doses varying from the one-sixth of a grain up to a grain or more, but it is better not to order a larger dose than is absolutely requisite, and it is well to bear in mind, in prescribing, that aloes, as well as many other drugs, have their purgative action much improved by being reduced to a state of very minute division, and mixed with other things. If small pieces of aloes should stick in the mucous membrane of the large bowel, that particular part might be severely irritated, and in consequence the patient experience great pain and discomfort; while, if the medicine was very minutely divided and mixed with a quantity of inactive or less active material, there would be no danger of any such deleterious action. When you prescribe aloes, you should always order it to be intimately mixed with other and less active sub-

stances. Let the pill contain, say, a quarter of a grain of the *Extractum Aloes Aquaosum*, with two or three grains of compound extract of Colocynth (*Extractum Colocynthidis Compositum*), and a grain of extract of Henbane (*Extractum Hyoscyami*). Although in these days it is the fashion to prescribe one remedy only, and I believe some distinguished physicians consider it improper to order more than two drugs in one pill or mixture, there is not the least doubt that, as far as regards the action of the medicine upon the organism, considerable advantage is gained by mixing several remedies together. Medicines, like foods, affect different people in a different way. If you prescribe several different things together, you may influence different idiosyncrasies, while it would be almost impossible to determine the particular purgative suitable for each individual patient. I must prefer a pill consisting of a little Compound Colocynth, a little Nux Vomica, a little Henbane, a small quantity of Podophyllin, and perhaps a little of the Watery Extract of Aloes, to a full purgative dose of any one of these preparations by itself. By mixing these things together, you get a less painful and more efficient action than you do from a large dose of one of them only. And to test the truth of this observation, you might carry out a very instructive experiment on your own organisms. Take, for example, one grain of Podophyllin and see how it affects you, and the next time you require a purgative take three grains of the Watery Extract of Aloes alone. On another occasion have a very small dose of Podophyllin or Aloes mixed with three grains of compound Colocynth pill, and notice whether, upon the whole, you do not get a better result with less griping pain than when you took the larger doses of the simple drugs.

Podophyllin has been much used during the last ten years, and was first employed in America. But it is a purgative

of somewhat uncertain action, and those who order it should take care how they prescribe it. I remember the case of a child who was almost killed by half a grain of Podophyllin, incautiously ordered by the practitioner, who perhaps up to that time had been employing some inferior preparation; but this prescription, being made up by a chemist who used good medicines, a much too powerful dose was administered. The drug varies much in quality, and it is, moreover, one of those things which acts very differently upon different people. I have patients who have been taking a small quantity of Podophyllin for many years, and they say they have never taken anything which acts so satisfactorily. On the other hand, I every now and then get into disgrace for ordering the same thing to other persons. The drug gripes the patient so much that he does not wish to try the remedy again. You should always order Podophyllin first in small doses, mixed with compound of Rhubarb or compound Colocynth pill, and if it causes no discomfort, you can easily increase the dose. Do not give more than one-quarter or one-third of a grain, unless you know, by experience, the patient can take larger doses with advantage.

Drastic and Hydragogue Purgatives can hardly be included among the remedies for slight ailments, but a few of them may be prescribed in small doses, for ordinary ailments. Thus Jalap, *Jalapa*, is a very old and useful purgative, which may be prescribed in doses varying from five to fifteen grains. It excites the flow of fluid from the blood into the intestine, and when prescribed should be mixed with an equal quantity of Bitartrate or Sulphate of Potash, *Potassæ Tartras Acida*, *Potassæ Sulphas*.

Jalapin is obtained from ordinary jalap by rectified spirit. It is the resin, in fact, *Resina Jalapæ*, deprived of

its coloring matter by animal charcoal. A small dose of from one to three grains will be found to act freely. It may be prescribed in a pill or as a powder, mixed with a few grains of sugar.

Elaterium, *Croton Oil*, *Gamboge*, are all violent purgatives, which are very useful in the treatment of some diseases, but are not required in the management of slight ailments. Drastic cathartics all excite the pouring out of a large quantity of fluid from the blood through the walls of the capillaries into the bowel.

In this place I ought properly to speak of the action of preparations of mercury, but as this subject will come under consideration a little further on, I shall postpone what I have to say under this head.

Saline Purgatives are very valuable in many cases of imperfect action of the bowels. Many of the salts used as purgatives act not only by promoting osmose of fluid from the blood by reason of the higher specific gravity of the saline solution in the intestine than that of the liquor sanguinis, and by their direct influence on the nerves of the mucous membrane, but also in consequence of being first of all absorbed into the blood, and then excreted by the glands and follicles of the mucous membrane of the colon. At the same time, many other substances are removed from the blood with the salt, and in this way the circulating fluid may be freed from certain deleterious constituents which have accumulated in it, and which if they remain would seriously interfere with the action and nutrition of various tissues and organs. Most salines act partly as purgatives and partly as diuretics, and not a few of them have the effect of increasing the secretion of many, if not of all, the glands of the digestive system.

There are many salts in the Pharmacopœia which you

will find useful, and some of them are very ancient remedies and well known in all countries. First of all, there is Epsom Salts, Sulphate of Magnesia, *Magnesiæ Sulphas*, and a very capital remedy it is. It is one of the cheapest of medicines, for a pound of it costs only a few pence. It may be given in doses varying from half a drachm to half an ounce or an ounce in solution in water. The latter dose, especially if dissolved in warm or lukewarm water, will purge very freely and very quickly. Sulphate of magnesia is not an unpleasant thing to take, especially if you mix with it about one-fourth of its weight of common salt and twenty drops of Aromatic Sulphuric Acid (*Acidum Sulphuricum Aromaticum*), the whole being dissolved in an ounce and a half of lukewarm water. I often order ten minims of dilute Hydrochloric Acid, *Acidum Hydrochloricum dilutum*, and two drachms of Sulphate of Magnesia, to be dissolved in an ounce and a half of Cinnamon Water, Orange Flower Water, *Aqua Aurantii Floris*, common water or Infusion of Roses, *Infusum Rosæ Acidum*. The last gives a rather pleasant taste and agreeable color to the draught, which should be taken in the morning before breakfast, or about two hours after that meal. If you consider it desirable to act upon the kidneys at the same time as the bowels, and often it is very important so to do, you may add a few grains of Nitre, *Pulvis Potassæ Nitratis*, and in this way you make a saline draught which you will find very useful to many of your patients. It may be taken day after day for three or four days, or twice or three times a week ; but it should not be continued for longer than a fortnight at a time.

Sulphate of Soda or Glauber Salt, *Sodæ Sulphas* of the Pharmacopœia, is not so strong in its purgative action as the Sulphate of Magnesia, but it is not nearly so disagreeable in taste. You may give two or more drachms of Sul-

phate of Soda dissolved in an ounce and a half of water. Or you may prescribe two or three drachms of the Sulphate of Soda with a somewhat less quantity of the Sulphate of Magnesia with five or ten grains of Nitre and a drachm of common salt. Salines generally act more powerfully if they are combined than if taken separately, and, as I have already said, their action is expedited and increased if they are dissolved in warm or lukewarm water.

Phosphate of Soda, *Sodæ Phosphas*, is another salt which acts well as a mild purgative in doses of from one drachm to an ounce dissolved in water. It is not disagreeable, and has been long known as "Tasteless Saline Aperient." It is a good saline for children, and may be given dissolved in weak beef tea or other form of broth or soup.

Soda Tartarata, a Tartrate of Soda and Potash, commonly called Rochelle Salt, used to be a very favorite saline purgative. It also acts on the kidneys. The organic acid of this salt, like citric acid and many more, becomes changed in the system, alkaline carbonates being formed which render the urine alkaline. The dose is from one drachm to half an ounce or more dissolved in water.

You may order a mixture containing half a dozen doses, and direct the patient to take an ounce, that is two tablespoonfuls, with one tablespoonful of hot water. If the dose is taken before breakfast it will generally act in the course of two or three hours, and many a patient will have good reason to thank you for the advice you have given him.

Many such saline mixtures may be used instead of purgative mineral waters. Their action is much the same, but you will find that not a few of the most prosperous of your patients will decline to take such salines as you can prescribe. They require a more fashionable form of saline in the shape of a purgative mineral water from some wonder-

ful spring warranted to cure all diseases and patronized by the nobility of Europe. In these days there are indeed a number of potent natural mineral waters having purgative properties from which to choose. A few years since, almost every person was advised to take Püllna water. This after a time, like the Epsom and Cheltenham waters, gave place to others. For years *Friedrichshall* has been credited with virtues of surpassing excellence, but now I suppose opinion is divided between this and the unpronounceable Hunyadi Janos bitter water. The latter contains much more of the purgative sulphates than Püllna, Seidlitz, Kissingen, or Friedrichshall water, and therefore acts more freely.

Friedrichshall water is a very good mild purgative saline. Its composition is shown in the following analysis, for which I am indebted to Mr. C. H. Piesse, Public Analyst for the Strand District. It seems to contain Sulphate of Magnesia and Chloride of Sodium.

ANALYSIS OF FRIEDRICHSHALL BITTER WATER.

	Grains per gallon.
Sodium,	657.5
Potassium,	6.1
Magnesium,	200.8
Calcium,	18.7
Silica,	1.7
Chlorine,	1003.1
Bromine,	0.13
Sulphuric acid (SO_4),	739.2

Carbonic acid not estimated.

Mr. Piesse remarks that if the "Chlorine" be calculated into "Chloride of Sodium," and the "Magnesium" into "Sulphate of Magnesia," and the amounts of the salts thus indicated be dissolved in one gallon of ordinary drinking-water, we shall have a solution very like the natural Fried-

richshall water, especially if the water be well charged with carbonic acid.

You may tell the patient to take a wine-glass of Friedrichshall or Hunyadi Janos water with as much warm water every morning before breakfast, and in many cases it may with advantage be prescribed with twice as much Carlsbad water made warm, or hot water added. For patients who object to the expense of mineral waters you may easily prescribe a substitute according to the principles already mentioned. Whether the Sulphate of Magnesia and Sulphate of Soda in the water obtained from a spring is in a state in any way molecularly different from the salts as sold by chemists has not been determined, but certainly the poor seem to derive as much benefit from solutions of ordinary sulphates of magnesia and soda, as the rich do from purgative mineral waters.

Sulphate of Potash, Potassæ Sulphas, is a very old saline purgative. It may be taken in doses of from ten grains to three scruples dissolved in water. It enters into the composition of many of our remedies in the Pharmacopœia.

Effervescing Saline Purgative.—But perhaps the pleasantest saline purgative is an effervescing draught. We have a very good purgative in what is now called *Granular Citrate of Magnesia.* I believe that much of what is sold under this name is really Citrate of Potash or Soda. The ingredients are mixed, and the water of crystallization in part driven off by heat, but the preparation is a difficult one to make well. The dose is from one to two teaspoonfuls thrown into a tumbler two-thirds full of water, and the mixture is to be taken during effervescence. The granulated salts must be carefully excluded from damp, but if this be done they keep for a long period of time. Such effervescing draughts must be very agreeable in hot climates. It is of course only a very mild form of purgative, but useful in a

great many cases when a cooling saline is required. The urine is rendered alkaline by the salt.

Many different forms of granulated effervescing salts are now prepared by chemists, containing Quinine, Strychnine, Pepsin, Bismuth, Lithia, and many other substances. Granulated Effervescing Salts constitute a very agreeable vehicle for many different kinds of medicine.

DIARRHŒA.

I pass now to the consideration of a condition the very opposite of constipation. Diarrhœa (*δια*, through, *ρεω*, I flow), though a common ailment, is less frequent than constipation, and is seldom habitual and persistent, lasting perhaps for the greater part of a lifetime, like the tendency to constipation. Now and then, however, you do meet with people who seem to suffer very frequently from a condition to which the term diarrhœa would be generally applied. To your inquiry if the bowels are open the patient will perhaps reply "too much so." On further questioning, you find that the bowels act three or four times every day. In some of these cases the patients do not appear to suffer pain; nor do they necessarily get thin and weak, or appear to be out of health. Whether the looseness depends upon a highly irritable state of the nerves of the mucous membrane, or is due to weak vascular walls, or to an altered state of the blood, or to a highly nervous disposition, it is often difficult to decide. In some cases the condition is said to be due to a peculiar habit of body, and undoubtedly there are types of constitution which are remarkable for the great activity of various secreting glands, just as there are others as remarkable for slow and imperfect action. In neither case is there any structural alteration; but one class is characterized by rapid, the other by sluggish change.

That diarrhœa may be produced through nerve influence

only, is proved by a number of circumstances. Many nervous people are very subject to it. Fright, anxiety, and sudden joy may be immediately followed by diarrhœa. Many students who have been exceedingly anxious concerning examinations, have experienced the influence of the mind acting through the nervous system upon the secretion of fluid into the intestinal canal.

To those who suffer from constipation, an occasional attack of diarrhœa is very advantageous, and is not to be regretted. Probably diarrhœa carries off many noxious materials that have accumulated in the blood, and may therefore be beneficial to some organisms, provided it only occurs now and then, and does not last for too long a time, and is not allowed to become very severe at a time when there happens to be an epidemic. You must not forget that an attack of typhoid fever is often ushered in by slight and sometimes by severe diarrhœa; but there is usually also a very decided rise in temperature.

There are times when diarrhœa must be guarded against, and, if it occurs, must not be permitted to persist. During an epidemic of cholera, a person suffering from diarrhœa must be very carefully watched, for if the condition continue unchecked for even a short time, it may become choleraic. In cholera times diarrhœa may pass very quickly into the stage of collapse of cholera. The disease usually begins with slight purgation, and you cannot tell whether a person is going to have a mild attack of ordinary diarrhœa or actual cholera. It therefore behooves us to be on our guard, and it is good practice to at once check all cases of diarrhœa during the prevalence of a cholera epidemic.

The commonest form of diarrhœa is that which we meet with in hot summers. Sometimes it prevails to a great extent in autumn. This is often called summer diarrhœa,

and it is hard to say exactly what occasions it. Certain it is that it is more prevalent in hot, dry summers than it is in cold, wet ones. Some would explain the fact by the superabundance and cheapness of fruit in the former, and its scarcity and high price in the latter. Plums usually get the credit of exciting diarrhœa, but the condition frequently shows itself before plums are obtainable. No doubt bad, unripe fruit and decaying fruit are very liable to irritate the bowels, and may excite diarrhœa. Neither is there any doubt that decomposing vegetable and animal matter will bring on an attack of diarrhœa; but what the particular organic material may be which exerts the deleterious influence I do not know. In summer the intestinal canal of many persons seems to be in an unusually sensitive or irritable state, so that very slight errors in diet are apt to derange its action for a time. Even a little beer that is out of order, or sour milk, will sometimes set up a very troublesome attack of diarrhœa, which may last for days, and require careful treatment to check it.

Concerning the precise changes which occur in ordinary diarrhœa, little is positively known. It is generally supposed that the fluid escapes from the capillary vessels; but at least, in some cases, it is more probable that the condition depends upon increased activity of many of the glands which discharge their contents into the intestinal canal. In sudden diarrhœa, depending upon the presence of some irritating material, I suppose transudation of fluid takes place from the vessels, as well as increased secretion from the glands. In many cases, for some time before the attack, it is probable that the blood has been in an unhealthy state, and free discharge of watery matter is of advantage to the patient, inasmuch as various noxious materials are eliminated, which would do harm if they were retained in it in a state of solution, and thus by the attack of diarrhœa is

the blood depurated, and may be very soon restored to its normal healthy state. Unquestionably, therefore, in such a case, diarrhœa may be regarded as conservative and advantageous.

Suppose a child has been eating a quantity of unripe fruit, and it is nothing very unusual for an English child to eat half a dozen unripe and very uninviting-looking apples; this will very soon produce an effect, and irritate the stomach and bowels, causing a sudden and, it may be, violent derangement, often with feverishness, the temperature in such cases not infrequently rising to 103° or 104°, with perhaps violent abdominal pain; and these symptoms may be sufficiently severe to excite alarm. If vomiting occurs relief is at once experienced, but more commonly purgation is excited, and may perhaps have continued for a few days before you are called in to see the patient. You cannot expect the diarrhœa will cease until the whole of the irritating matter which excited it has been removed, and the sooner this result can be effected, the sooner will relief be afforded. All the particles of half-masticated apples containing immature acids and other irritating organic compounds, must be removed from the alimentary canal before the diarrhœa will cease. In such cases, therefore, it is bad practice to attempt to check the diarrhœa until you feel sure that the whole of the irritating substances have been entirely got rid of. It is even desirable to encourage for a time the flow of fluid from the intestinal canal, for in this way the noxious matters may be washed away. For this reason you will often have to administer a mild purgative to expedite the removal of the matter which excited the purgation. You purge to stop purgative action, and this you will often find is the best and shortest method of checking the diarrhœa of children. Of all the purgatives with which we are acquainted that are known to remove irritat-

ing matters from the intestinal canal, oily purgatives are the most suitable. Common olive oil, *Oleum Olivæ*, will act in this way, and for very young children is quite sufficient, but as a general rule you will find it expedient to give Castor Oil, *Oleum Ricini*, the purgative action of which is more decided. There is an active principle in the Castor Oil, which affects the action of the stomach and glands, and vessels of the upper part of the alimentary canal. In this way Castor Oil in its action contrasts with Aloes, Colocynth, and Sulphate of Magnesia, which act mainly upon the lower part of the small intestines and the colon. I suppose Castor Oil excites increased secretion in the stomach, the duodenum, the jejunum, and ileum, causing a quantity of fluid to be quickly poured out from the vessels and glands of the mucous membrane. Thus the alimentary canal is thoroughly flushed in every part, and the action takes place from above downwards. Any irritating matters that may be present are thus swept away. For this reason, and for the further reason that Castor Oil is a substance which does not irritate the mucous membrane in any undue or uncomfortable way, it is the best purgative to give in any cases in which you have reason to attribute the diarrhœa to injudicious eating. Particularly in the diarrhœa of infants and young children is Castor Oil the safest remedy. As a general rule, you will find a much smaller dose of Castor Oil will act than is usually administered. To a child of ten years old you may give half a teaspoonful or a teaspoonful; to an adult, two teaspoonfuls, but a single teaspoonful of Castor Oil will be sufficient for many people. The objection to Castor Oil is its nauseating, disagreeable flavor. I have already referred to the best way of taking it, and have offered some suggestions for disguising the taste. See p. 156.

After diarrhœa has continued for some time, there is

often a good deal of severe griping pain all over the stomach, or at least in its upper part. At the same time the patient feels chilly or very cold, and may actually shiver; very generally there is more or less flatulence, with acid eructations, loss of appetite, and occasionally distressing nausea. The tongue is usually furred, and there may be a nasty taste in the mouth, or the mouth may feel clammy and disagreeable. After diarrhœa has lasted for several days, there may be considerable depression of the heart's action, and not unfrequently severe cramp in various muscles increases the distress. Acid eructations and the rising of acid fluid into the mouth will be relieved by the administration of alkalies and other so-called antacid remedies. You may give alkalies, such as *Potash*, or the *Carbonate of Potash* or *Soda*. Preparations of Bismuth are also useful, as the *Carbonate of Bismuth* (*Bismuthi Carbonas*), or the *Nitrate*, the old *Trisnitrate of Bismuth* (*Bismuthi Nitras*), or, better, prepared chalk (*Creta præparata*), or precipitated chalk (*Calcis Carbonas precipitata*). But one of the best as well as simplest remedies to give in these cases, and particularly in gastric and intestinal derangements occurring in infants and very young children, is Lime Water (*Liquor Calcis*). This is an extremely valuable remedy, which is not used as much as it deserves to be. Infants are very subject to diarrhœa, and I fear that many a child has been lost simply from allowing diarrhœa to continue, which would have been easily checked if sufficiently early in the attack a few doses of Lime Water or sweetened Lime Water (*Liquor Calcis Saccharatus*), had been given. Anything of an irritating character will very soon disorder the delicate mucous membrane of the intestinal canal of an infant, and a very simple remedy administered at the proper time will stop it, but if the purging be of a severe form, and it be allowed to continue for a few hours, extreme exhaustion may ensue, and be soon followed

by death. In these cases, mothers often make the unfortunate mistake of feeding the child too much. Fearing lest it should be starved, they keep pouring in milk. The secretions, already out of order, get worse, and the milk, instead of being properly digested and assimilated, is rejected in the form of curd, or the curd is passed onwards into the small intestine. This coagulation of the casein, without subsequent solution, persists perhaps for many days, sometimes for a week or more, and each new portion of milk that is swallowed undergoes the same change. Thus, the intestinal canal, in every part of its course, may become filled with firm white coagula, and these form the greater part of every evacuation. After death from violent diarrhœa it is not uncommon to find the intestines even distended with this coagulated and undigested curd.

Such cases of diarrhœa in infants may often be relieved at the onset by small doses of lime water. A little may be mixed with the milk, in the proportion of a tablespoonful or less of lime water to half a pint of milk. Sometimes potash water answers better, and I have used liquor potassæ, in the proportion of twenty drops to half a pint of milk. But you must not allow the child to take as much milk as it likes. For a day or two half a pint of milk in the twenty-four hours may be sufficient. It must be obvious that, as long as the disturbed state of bowels continues, it will be worse than useless to push food. We must allow time for the alimentary canal to become partially emptied of its irritating contents before fresh nourishment is introduced. If the child is at all low, it must be supported with small doses of brandy—from ten to twenty drops in a teaspoonful of water or milk and a little sugar, once in two hours. You cannot be too careful in watching cases of infantile diarrhœa, especially in weak children, for it sometimes happens that serious exhaustion comes on quite unexpect-

edly, and if you do not visit the patient every few hours, a sudden change may occur and the case become hopeless before you come to its assistance.

I have already drawn your attention to the fact that in these cases bacteria often grow and multiply to an enormous extent in the casein clots. In many cases every part of the intestinal canal is pervaded by millions of these organisms, which grow and multiply in the altered secretions and food which is continually being pressed into the stomach, and consequently the changes which ought to take place in the food prior to its absorption and conversion into healthy blood do not occur. Children may, under these circumstances, die of starvation, although they have been but too liberally fed during the whole period of the illness, for the food merely serves to encourage the growth of bacteria, and it undergoes changes which interfere with its digestion and absorption. If just at the right time you withhold food perhaps only for a few hours, everything may right itself; the irritating matters may themselves act a little on the bowels, and will thus get pushed onwards by the contraction of the muscular coat of the intestine. Diarrhœa may last for a few hours or so, or for a day or two, and then the secretions resume their natural characters, and the child will be out of danger.

In treating diarrhœa in children, particularly infants, you must take care that the child is kept warm, for one of the principal causes of diarrhœa is cold. Cold water will very often bring on diarrhœa even in adults.

You should be aware of the different characters of the stools in different forms of diarrhœa. If they are of a natural color and odor, you may let the diarrhœa go on for awhile, for it will probably do no harm, and will most likely stop without any medicinal treatment. But if the stools should become much altered in character—if they should

emit a sour smell, and the secretion should have the appearance of rice water, it will probably be necessary to check the discharge. For such evacuations, as well as those which are colorless or almost colorless, consist wholly or in great part of secretions poured out from the glands and from the vessels of the mucous membrane of the lower part of the small and of the large intestine. You will find in such evacuations much altered mucus, with numerous small cells (bioplasts) from the follicles as well as from the surface of the mucous membrane, chiefly of the colon. Not unfrequently you will find a little blood, and sometimes there is more albumen than the blood will account for. If the increased formation of mucus continue for a considerable period of time, it is often associated with a serious change in the tissues of the mucous membrane itself. After such an excessive action has gone on for several days or weeks, there may ensue an excoriated and almost lacerated state of a small portion of the surface of the mucous membrane. A sort of superficial ulcer results, from the surface of which blood will from time to time escape, and, by the continual drain of nutrient matter and general disturbance of the action of the bowel, a low state of health may be induced which, with the local affection, constitutes a very serious disease, not uncommon in many tropical climates, but happily rarely contracted here. The malady in question is known as Dysentery, but certainly it cannot be included among the slight ailments.

Not unfrequently, however, in this climate the colon is the seat of great uneasiness, often amounting to actual pain. In many of these cases it is unquestionably the mucous membrane which is affected. The capillaries of a limited area become congested, and the congestion not unfrequently passes into ulceration, and we have an approach to that state of things which gives rise to dysenteric symptoms.

But more commonly the patient gets better before actual ulceration occurs. If we could see the mucous membrane, I have no doubt we should find it, in the immediate situation of the painful spot, swollen, red, and exceedingly sensitive. Every time the muscular coat contracts the dull pain changes in character and becomes severe. The affection may occur in any part of the colon, but I think the sigmoid flexure, the cæcum and one or other end of the transverse colon, are the situations to which the pain is usually referred, and, as regards frequency, in the order in which I have named them. If small pieces of hardened fæces or the *debris* of food happen to be forced into contact with the spot, sudden attacks of exquisite pain, of a cutting or tearing character, may be experienced.

Not unusually the state of mucous membrane I have described persists for a considerable period of time. This condition may last for weeks, or even months, just as a portion of skin may be deranged by congested vessels, and chronic changes induced in the epithelium, and continue for a long period. Such morbid changes may be stopped by judicious interference, but they often resist remedial measures for some time. In the case of the colon, it is of the first importance not to allow anything of an irritating nature to pass along it, to restrain its action as far as possible, and to prevent the formation of wind, and the consequent irregular contraction of the muscular coat. Ordinary diet must be withheld for a time, and the patient must live upon milk, thickened or not with flour, Indian corn, or lentil flour, arrowroot, sago, tapioca, or other bland non-irritating starchy matter. Cream, puddings made with eggs, such as boiled batter, may be allowed, but anything containing hard particles that might get imbedded in the mucous membrane, or irritate the tender spot, must be avoided.

In some forms of diarrhœa, which are often spoken of as "bilious," you will notice a very peculiar alteration in the character of the stools, which are very dark-colored, and not unfrequently may be fairly spoken of as black. Sometimes the color is such as to suggest the idea that bile has passed down the intestine without undergoing the usual changes, and forms the chief constituent of the fæces. It would seem that, in some of these cases, bile had been accumulating for a considerable period in the gall-bladder, until this viscus, having become considerably distended, suddenly expelled its contents, which were at last discharged in such considerable quantity that much passed almost unchanged from the alimentary canal.

You must be careful not to make a mistake with regard to the peculiar alteration of the color of the motions which is produced by many preparations of iron. If a person takes iron, his motions will become almost black, owing to the action of the sulphuretted hydrogen of the alimentary canal producing a dark black compound with iron. Salts of bismuth and lead also impart to discharges from the bowel a very peculiar dark color. It is important to distinguish all these changes from those caused by the presence of blood, which is itself much changed in color by the action of the intestinal gases and fluids which act upon it.

Treatment of Diarrhœa.—In all forms of diarrhœa, particularly where there is much abdominal pain, it will greatly contribute to the comfort and relief of the patient if you at once apply warmth to the external surface and recommend that the patient be kept in a warm room. He should lie down and rest, and if the attack be severe he should be in bed. Cold unquestionably tends to keep up diarrhœa, and may in fact cause it. Cold also increases the sufferings of the patient. Hot fomentations to the stomach have been strongly recommended, and certainly

afford relief. Various plans may be adopted. One of the simplest is to wring flannels out in very hot water, and have them quickly applied; or, two or three thicknesses of flannel held before a good fire until it is quite hot, may be preferred. The wet or dry flannels should be covered with a piece of oiled silk or mackintosh, which will prevent rapid cooling. A better plan is to procure at one of the shops where india-rubber things are sold, a hot-water bottle made of good strong vulcanized india-rubber. It should be eight or nine inches by fifteen, and covered with woollen material. In cases even of very severe griping pains great relief will be afforded if the bottle containing hot water be placed close to the skin of the abdomen while the patient is lying on his side, and kept there for an hour or more. Those who are subject to troublesome attacks of diarrhœa should wear during winter and summer a good thick flannel belt made for the purpose.

There are many potent remedies for checking diarrhœa. We have alkalies, the action of which I have already referred to; then there are many astringents, certain metallic salts, acids, and sedatives.

Astringents (*astringo*, to bind) are often of use in diarrhœa, and unquestionably check it. Amongst these may be mentioned "*Krameria*," "*Kino*," "*Catechu*," "*Logwood*;" and several more are in general use. The value of many remedies used in diarrhœa is perhaps, in great measure, due to the tannin, and this substance itself may be prescribed. It is a powerful astringent, and prevents the transudation of fluid through the walls of the vessels. The precise action of the tannin is not fully understood. It may act directly upon the tissues themselves, and probably alters the permeable or diffusible property of the fluids. At the same time no doubt it acts upon the afferent nerves distributed to the capillaries, and through these, causes con-

traction of the muscular fibres of the small arteries by which their calibre is reduced. Logwood, *Hæmatoxylon*, is much used in the treatment of ordinary diarrhœa. You may order the decoction of Logwood, *Decoctum Hæmatoxyli*, in doses varying according to the severity of the disease. Begin with small doses, say from two drachms to half an ounce of the decoction once in three hours, and if the diarrhœa still continues increase the dose to an ounce, and give the remedy more frequently.

Of astringent tinctures like the Tincture of Catechu, *Tinctura Catechu*, the Tincture of Kino, *Tinctura Kino*, and the Tincture of Rhatany, *Tinctura Krameriæ*, you may prescribe from half a drachm or a drachm to three drachms in a mixture, and you may give this once in three hours, and if the diarrhœa goes on, once in two hours. Many order one of these astringent tinctures with chalk. Chalk mixture, *Mistura Cretæ*, and the Aromatic Powder of Chalk, *Pulvis Cretæ Aromaticus*, are valuable remedies in ordinary cases of slight diarrhœa.

Next, with regard to the use of Opium. If there is anything irritating the bowels that requires to be removed before the diarrhœa can cease, opium is not a good remedy to employ. As I have already explained, p. 172, a purgative is necessary to expel the irritating matters before the diarrhœa will cease.

If, however, the diarrhœa has lasted for a considerable period of time, and the patient is exhausted, and you have reason to believe that instead of the bowels being filled with irritating matter, they are empty or nearly empty, the mucous membrane irritable and sore, with constant and irregular contractions of the muscular coat, giving rise to severe griping and excruciating pain, opium becomes a most valuable remedy. In such cases small doses of opium frequently repeated answer best. You may give five or ten

drops of laudanum in each dose of a mixture for an adult, but never give opium in any form to young children. I prefer to give opium in severe cases of diarrhœa in the solid form. A quarter of a grain of solid opium, or half as much of the extract, *Extractum Opii.* Dover's powder may also be given in the form of a pill. The composition of Dover's powder is known to most of you. Two grains will contain one-fifth of a grain of opium. This quantity or more of Dover's powder, the compound Ipecacuanha powder, *Pulvis Ipecacuanhæ Compositus,* may be given in the form of a pill once in three or four hours if the diarrhœa persists. Or you may give the patent medicine Chlorodyne, which is so well known, perhaps too well known, to non-professional persons. Chlorodyne is a mixture of many things, but it undoubtedly acts beneficially, and agrees with some persons who cannot take ordinary preparations of opium. There are many other remedies frequently ordered, but I cannot refer to them in this place.

VERTIGO, GIDDINESS.

Vertigo, swimming in the head, or giddiness, is an indication sometimes of disturbed action of the stomach and liver, and sometimes of deranged circulation and disturbed heart's action. But this symptom may also be due to affections of the nerve-structure of the brain or the small arteries which supply it. The exact seat of the lesion varies, but in animals injury to the crus cerebri, as well as certain injuries to the cerebellum, are followed by vertigo. For one case, however, which is due to serious disease of the brain or its vessels we shall meet with a large number which depend upon temporary derangement of the digestive organs.

The giddy feeling after waltzing for too long a time, or

turning round on one leg many times, is within the experience of most of us, and is a form of vertigo. You will find in some works on brain disease that vertigo is mentioned as a prominent symptom of serious cerebral disease, but if a patient comes to you complaining of vertigo, do not at once shake your head and look very grave, though you may have read records of cases in which it was a symptom of some terrible disease of the brain or cerebellum, or was found to be due to some tumor or other incurable morbid growth; for if you do so, you may afterwards discover that you have given a very foolish opinion. You ought to know that this, like many other symptoms, may be due to a mere transient disturbance in connection with the circulation, or of the nerves presiding over the calibre of vessels distributed to a very limited area of tissue. Nor must you forget that giddiness may be brought about by distal derangement, as well as by a local temporary or permanent change. Temporary derangement of the stomach or liver, and probably very slight changes affecting both, will, as I have said, account for vertigo as it occurs in many cases which will come under your notice. There is a form of vertigo which is due to mere fancy or imagination. Having experienced the feeling of giddiness on one or two occasions, patients fancy it is continually coming on. Violent attacks of coughing, especially in the case of weak persons, may occasion very severe attacks of vertigo. Patients who have been ailing for some time, though not suffering from any definite malady, and those who have long been troubled with loss of appetite or impaired digestion, are frequently subjects of vertigo, and may soon be cured by judicious management as regards diet and wine or other stimulants. Small quantities of good soup at intervals of a few hours, and two or three glasses of Burgundy or port wine daily for a short time, may be ordered in such cases, and will often

cure the giddiness and restore the general health in a week or two.

There are some persons who are very frequently troubled with a curious form of vertigo or giddiness, not arising from any organic disease whatever, or leading to any change which shortens life, or even seriously deranges the health. In not a few instances vertigo seems to be due to excessive nervousness. I have known highly nervous people of both sexes suffer from the most severe vertigo, preventing them from walking for many days, and coming on every time the head was slightly raised from the pillow. Sometimes disturbed co-ordinating power of the muscles of the eyeball is accompanied by giddiness. Vertigo occurs in many cases of blood-poisoning—in some forms of fever. It may be brought on by sudden loss of a considerable quantity of blood, as from hæmorrhage, and it often occurs in anæmia. In some forms of epilepsy vertigo is a prominent symptom.

The word *vertigo* comes from *vertex* or *vortex*, a whirlwind, which is derived from "*Verto*, I turn." The sensation is sometimes described as a swimming in the head. Objects seem to be moving in a strange and irregular manner. Many cannot look from a great height downwards without feeling giddy. Vertigo may be brought on by taking certain substances. Opium will cause it; alcohol causes vertigo very commonly. Any one who has seen a person a little tipsy knows how his power of co-ordinating the muscular movements of his body is affected, and how he rolls about from one side to the other, and in consequence of feeling giddy is unable to walk in a straight line. Tobacco will also give rise to a form of vertigo, especially when it is brought into contact with nerves and nerve-centres which are not accustomed to its influence.

Peculiar disturbances in vision occur in many cases of

vertigo. Things look crooked, or people can only see a portion of an object. They can see the upper half without being able to see the lower half of a person, and so on. These disturbances of vision do not necessarily imply anything more severe than temporary functional disturbance, perhaps due to some irregular distribution of blood in the capillary vessels of parts of the central ganglia, consequent upon sudden alterations in calibre of the small arteries, caused by disturbed action of the nerve ganglia which regulate and preside over the action of the arterial coats. Such symptoms may mean, it is true, something far more serious, but in many cases they certainly depend upon no more serious or important changes than may be determined by taking a little more wine than is good. Swimming in the head is by many considered a form of vertigo. Persons who have been for some time over anxious, or who have been overtaxing the mind or body, may suffer in this way. In the last case, the unpleasant symptoms may disappear ten minutes after taking a dose of sal volatile or a glass of wine. If, however, they do not do so, they will probably be relieved by a little attention to diet, by a dose or two of calomel or blue pill, and afterwards the general health may be improved by taking a tonic containing acid and bark for a week or two.

Aural Vertigo.—Disease and injury to the semicircular canals of the ear may cause a feeling of giddiness and a tendency to fall, as well as vertiginous movements, the direction of which, forwards, backwards, or from side to side, is determined by the particular semicircular canal which is affected. Ménière as long ago as 1861 directed attention to a class of cases in which noise in one ear—humming, buzzing, whistling, puffing—giddiness, nausea, vomiting, often associated with pallor, headache, and faintness, occurred in connection with disease of the semicircular canals,

or of other parts of the ear, influencing these canals and the structures they contain. The attacks at first are slight and occasional, but gradually the noises in the head increase in intensity and are almost constant. At last absolute deafness of the affected ear ensues, and, in consequence of the nerve structures being destroyed, the giddiness and other symptoms cease. You will, however, meet with the symptoms above enumerated in cases in which there may be no reason to suppose that organic disease of any form exists. The attacks, after recurring several times, will at last cease, leaving the patient perfectly well. Some of these cases seem to belong to the category of sick headache, and the attacks will be relieved by a small dose of calomel, blue pill, or gray powder. In such instances it is very probable that there is temporary disturbance of the circulation in the internal ear, as well as in other parts. Very nervous fanciful people will sometimes complain of the symptoms of Ménière's disease, but as they quite recover under the influence of tonics, good living, and change of air, it is more likely that the symptoms are due to slight and temporary nerve disturbance, than to any definite morbid change in any form of nerve or other tissue.

BILIOUSNESS.

It is difficult to explain the various phenomena which constitute what is known as biliousness, although very many persons are well acquainted with the symptoms of the bilious condition, and have frequently experienced them.

Whether there is congestion of the liver in all cases, I cannot tell you, for I am glad to say that I never saw a *post-mortem* of any one who had died during an attack of biliousness. Whatever may be the essential nature of the malady, it is not fatal. Nay, bilious people are for the most part

long-lived. Some physicians who have experience in connection with life insurance business, so far from objecting to take bilious people, are rather desirous of insuring them. In this opinion I fully concur. There is no doubt that a tendency to biliousness makes people very careful as to their mode of living. They cannot exceed without suffering. Bilious persons are often very fidgety about their diet, for if they eat too much a bilious attack comes on, which does them no great harm, but which for the time completely unfits them for their ordinary work. Although biliousness is anything but an agreeable malady, nevertheless bilious patients are, as I have said, often good lives, and you may generally recommend them with confidence for various occupations in which endurance is required. The capacity for going steadily on for a long period of time is often associated with a bilious habit of body. I fancy a very large share of the best work of the world is performed by the bilious. Such a tendency is frequently associated with much energy, and although there may be also some irritability of temper, there is frequently a very remarkable degree of patience, persistence, and resisting power.

Although I cannot give an accurate description of the pathological phenomena of biliousness, I can help you to form an idea of the sort of unpleasant sensations experienced by bilious people, by describing in his own words the sufferings of a gentleman who had been bilious all his life, but who nevertheless managed to live to a very advanced age. My friend was a man who might have done great things and left his mark; but I fear he lost much, and perhaps the world lost more, from the circumstances that he happened to have a good private fortune. He was, moreover, unwise enough to allow himself to get into that habit of reflecting too much upon slight physiological derangements occurring in his own organism, and gradually got into the bad habit

of talking to his friends about his aches and pains. Being rich, he was listened to, and further spoilt by the sympathy and pity foolishly bestowed upon him. As age advanced, the interest of his environment seemed to him to diminish, and the growls and grumblings, excited by sensations within himself, got more intense, until at length he was forced to seek for professional consolation. He consulted the most distinguished members of the profession, but no one succeeded in curing his biliousness, or in teaching him to bear it patiently. He grievously troubled his family by his reiterated complaints, and by his persistent anxiety about himself. For years, though on occasions he felt pretty well for a day or two, he failed to make himself happy. His naturally bilious condition was a source of constant worry to him. Every kind of treatment was tried, but nothing cured the derangement, or averted the attacks. Blue pill afforded some relief, and was the only remedy persisted in from first to last. All his tissues were probably sound, and I doubt if there was any serious morbid change in any organs after more than ninety years of work.

This gentleman was seen by me many times, and wrote down for me a description of his sufferings. Here it is: "Flatulence, distension of the bowels, and painful sensations between the shoulders, coldness of the feet, twinging pains occasionally under the right shoulderblade, nausea after eating. Muscular pain about the head and neck,—particularly the muscles at the back of the neck." The last is a very common symptom, and a very painful one in many cases of biliousness, and recurs in almost every attack. This old gentleman ate too much, and no wonder he was disturbed at night, and complained of "harassing and long distressing dreams." He also suffered, as very many old people do, from "irritation of the skin of the body generally, but of his legs principally, and from soreness and erup-

tions about the mouth, affecting chiefly the upper lip." Such was the long catalogue of recorded symptoms, and the list by no means exhausts all this old gentleman's complaints.

Some who suffer from biliousness seem to be always alternating between a state of misery and despair and a state of comparative comfort and hopefulness. You will sometimes find the patients bilious and irritable and out of temper, and very indisposed to do what you may wish, unless indeed they have sufficient self-command to overcome their natural bent. Another time you find them in excellent spirits, and ready to do anything for you, and as agreeable as possible. Thus it happens that we often have very contradictory accounts of the same individual, one person telling us that he is a most disagreeable, cantankerous person, and another affirming him to be a most pleasant and excellent man, the conflict of testimony depending upon the circumstance that one informant happened to see him when he was suffering from biliousness and the other when he had just recovered from an attack.

It seems curious that we should not be able to fully explain such very prominent and persistent functional derangements as affect important organs in cases of biliousness, more especially as the condition is a common one, and has been often experienced by well-trained scientific and thoughtful members of our profession. But I have never been able to get, from any physicians with whom I have conversed or from any books I have read, what seemed to me to be a clear and satisfactory account of the disturbance which occurs in an attack of biliousness, or of the actual changes which affect the action of the peccant organs during the prevalence of the attack. There is, however, no doubt that there is actual disturbance at the time in the liver. When biliousness is experienced, the changes taking

place in this organ, and probably in the stomach, differ in important particulars from those which occur in them under ordinary circumstances.

The liver is not concerned merely in the secretion of that fluid which we know as the bile, but it has to do with many other changes. Among the most remarkable phenomena of the liver are its sugar and fat producing powers. It also effects great changes in albuminous matters and peptones, which have just been taken up by the vessels of the intestines and carried to it dissolved in the portal blood.

Concerning any slight derangements which the sugar-forming functions of the liver no doubt undergo from time to time we know comparatively little, but we do know that these functions may be so disturbed as to result in the establishment of a most serious change in the action of the organ which, when once started, usually persists, and at length ends in death. In Diabetes, particularly as it occurs in the young, many ounces of sugar are formed during each period of twenty-four hours, and the kidneys are chiefly concerned in the removal of the sugar from the blood, but the tears and other secretions also contain sugar when the diabetic state is established. This formation of sugar, although varying in activity from time to time, and under the influence of remedies, cannot certainly be stopped. It continues in the great majority of well-marked cases, and gradually exhausts the patient, until, after a period varying from a few months to two or three years, death results.

On the other hand, I may confidently state that, under certain conditions, though these cannot be exactly defined, the liver may be seriously deranged as regards its sugar-forming functions, not only without causing death, but even without apparently deranging the general health or nutrition of the patient. In old age it is not an uncommon thing to find a certain amount, and, occasionally, an enor-

mous quantity of sugar in the urine of a person, although its presence was quite unexpected. It would seem that, in old age, the sugar-forming action of the liver may be greatly in excess of what it is in the normal state, and although the sugar pervades the blood and is carried by it to the various tissues and organs of the body, it scarcely seems to affect their action. At any rate, it may continue uninterruptedly for more than twenty years, and the patient may die at an advanced age of some other malady. Not only so, but any healthy person may for a time form considerable quantities of diabetic sugar, if he will take more than a moderate quantity of cane sugar. A man who took a dose of a quarter of a pound of ordinaty sugar passed diabetic sugar in his water for two or three days afterwards, but this temporary diabetic state is not to be induced so easily in every person. The liver is the organ by which the change is effected, and if you think over these facts you will, I think, agree with me in thinking that, in many slight derangements of the health, some other functions of the liver, instead of or as well as its bile-forming office, are at fault. The action of the liver-cells, in connection with their influence on the formation and transformation of fatty, albuminous, and amyloid matters must, therefore, not be lost sight of, in our efforts to determine the causation and treatment of many slight derangements of the health which seem referable to the liver.

But as regards "biliousness," it seems to me that the yellow tinge of the conjunctiva so commonly observed, the alteration in the color of the skin, the disturbed action of the sebaceous glands, the dryness of the skin, the sense o weight in the right side, the derangement of digestion—allf point to the fatty and bile-forming actions of the liver-cells as being mainly at fault. This view is confirmed by the fact that medicines which correct the changes just referred

to are those which unquestionably act upon the bile-forming process, and undoubtedly relieve the patient who suffers from what is known as a bilious attack. Indeed, some cases of severe biliousness approach so nearly to those of temporary jaundice, which I shall presently consider, that I am almost inclined to regard them as related to that condition. Possibly, it may be correct to consider them as a mild form of the same disorder. Some forms of biliousness may be due to an inactive state of the cells, in consequence of which substances remain in the blood which ought to be separated from that fluid and converted into bile. The sluggish state of the circulation, the tendency to the accumulation of the blood in the capillaries and veins, as shown by the distension of the capillaries of the papillæ of the skin and the free bleeding which takes place if they are divided, the formation or increase of hæmorrhoids, the turgid state of capillaries near slight scratches or wounds, and the indisposition of the latter to heal, indicate such disturbance of the capillary circulation generally as would result from the accumulation in the blood of substances which ought to be properly eliminated from the circulating fluid.

The Treatment of Biliousness.—The only medicine that relieves many bilious people is a small dose of some mercurial preparation. The old gentleman to whose case I have already referred, discovered that blue pill alone gave him ease, and dissipated for a time the unpleasant sensations from which he suffered, and which made him at times perfectly wretched. He took blue pill of his own accord, whether the doctors allowed it or not. For forty years he seldom went four days without a pill. He tried over and over again to get out of the habit, and many advisers strongly recommended him to try to give up taking mercurials. He made many attempts, but in a short time his sufferings became so great, that he was at last always obliged to return

to his favorite remedy. He seldom, however, took more than a grain once in four or five days.

I do not mean to imply that you will cure every case of biliousness if you give mercurials, but certainly the great majority that come under your notice will be benefited. Many cases resist every effort to cure them, but it is the exception to meet with a sufferer who cannot be in some degree relieved by treatment. The bilious habit seems to be due to an unusually sensitive, irritable stomach and liver, which will discharge their functions fairly in a moderate degree, but which cannot be made to perform more than this moderate amount of work, without getting much out of order; so that where you have to treat patients suffering from biliousness, you must be careful to give directions concerning diet, which should be very moderate.

Most of the organs taking part in the digestion and assimilation of the food seem to strike work when the bilious attack comes on. If food be taken, the suffering becomes greater. The fact seems to be that the digestive organs require rest for a time, and if when an attack comes on this rest is given, the bilious state passes off, and then the patient feels extremely well, perhaps for a considerable time.

In general you will find that those liable to bilious attacks require very little meat. Free meat eating will often bring on an attack. Generally, rich foods do not agree. Fatty matters in certain forms and in moderate proportion must be taken, but cooked and half-cooked fatty materials, as in many sauces, soups, fried fish and meats are not suitable. Cream or much milk sometimes precipitates an attack. Most forms of alcohol, and any form in quantity, will generally disagree with the patient. Vegetables and many fruits on the other hand agree well; vegetable acids seem to help the action of the liver and stomach. From half an ounce to an ounce of lemon-juice daily for a time

is undoubtedly useful in many instances. Cider and perry in moderation can be taken by some bilious persons. Citrates, tartrates, acetates, may also be given. Light puddings composed of starchy matters of various kinds, such as rice, Indian corn, sago, or tapioca, made with milk and eggs in small quantity, with plenty of bread, may be enumerated among the articles of diet for the bilious. Generally, such persons are of necessity small eaters—their organs rebel before it is possible to damage them by overwork, and so they seldom die of those diseases which cut short the life of so many who enjoy good living, and possess strong digestive organs. Hence, the bilious often live to be old. When an attack comes on, benefit often results from the use of mild purgatives. Effervescing citrates and tartrates do good. Liquor Ammoniæ Acetatis and Muriate of Ammonia have been also prescribed with advantage in many cases. I have often recommended grapes, in quantities of half a pound a day, when they can be obtained. Many persons have been relieved by taking from six to ten tumblers of fluid in the course of twenty-four hours, for two or three days at a time. Ordinary soda water, or Brighton seltzer, or Apollinaris water may be ordered. The kidneys are in this way made to act very freely, and relief soon follows.

Where the bilious state is very severe, and in some cases it is so severe as to incapacitate people from performing any kind of work for the time,—you will often afford relief, and in a very short time, by giving a small dose of blue pill or calomel. Some who suffer from biliousness also experience violent headache at the time, and this symptom is also relieved by the blue pill or calomel, and frequently in the course of a very few hours after the medicine has been taken. Indeed, some who suffer much, and who are generally speaking in anything but a good state of health, may yet be able to get through their work with the help of an

occasional dose of a mercurial—from one to six grains of gray powder once in five or six days. I am not aware that any deleterious effects are produced by this system in persons who suffer much from biliousness. Of course, it is not desirable for any one to be continually taking mercurials, or any other drugs for that matter, but it is better to take mercurials now and then, than to be utterly incapacitated for one or two days out of every ten or twelve, as is the case with many who suffer from this most unpleasant ailment.

From some experiments performed by Dr. William Rutherford on the dog, it appears that several vegetable substances act as stimulants to the secretion of bile, and it has been inferred that they act upon man as well as upon the dog. Among the most important of these cholagogues, are Iridin, Baptistin, Juglandin, of each of which from two to four grains may be prescribed for a dose, Euonymin in doses of from one grain to two grains, and Phytolaccin, of which the dose is from one-eighth of a grain to a grain. These remedies are made by John Richardson & Co., of Leicester, who prepare them in the form of pills "pearl-coated," and of several different strengths. Dr. Rutherford's observations will be found in the *British Medical Journal*, Feb. 8th, 1879.

The consideration of the bilious state prepares us for the study of an allied condition, which is more severe, and which may be due to the operation of circumstances differing from those by which biliousness is induced, only in their more full development, or greater intensity.

Jaundice is a rather common affection, particularly in summer, but it may be due to many different causes, some of which are serious and irremediable, while others are unimportant and transient. The particular form of jaundice to which I am about to refer, may with propriety be in-

cluded under the head of slight ailments. It is known as *ordinary* jaundice, and I dare say that a proportion of us, amounting to perhaps thirty or more per cent., has suffered from an attack of jaundice, or will probably do so before the age of twenty-five is passed.

The physiological changes in the system must needs be very much modified if the bile which is formed in such considerable quantity, instead of being poured into the intestines, is prevented from escaping and is retained in the gall-bladder. In every form of Jaundice the bile is formed but cannot escape by its usual channel. Most commonly the Common Gall Duct, *Ductus Communis Choledochus*, is plugged; and the bile, which has been formed by the cells of the liver, and has passed into the gall-ducts, is obstructed in its further course towards the intestine, and after accumulating to some extent in the ducts and in the gall-bladder, it gradually makes its way through their coats and is taken up by the lymphatics and veins which lie outside them. The bile formed by the liver then passes into and circulates with the blood. Tissues in all parts of the body become stained, and in some cases are seen to be of a deep yellow color. Textures both at the surface and in the interior of the body are thus stained more or less intensely in cases of jaundice.

Not only so, but the excretion of the yellow coloring matter which has been formed originally in the liver, and has been absorbed into the blood, is effected to some extent by the kidneys. Mucus, epithelial cells, casts, and even some crystals passed in the urine are tinged of a bright yellow color, while the urine itself contains a good deal of yellow biliary matter. Sometimes it appears of a dark green color, owing to the quantity of bile it contains. On the other hand, the secretions from the bowel are clay-colored or colorless.

Whether the impediment which interferes with the pas-

sage of the bile into the intestine in these cases of temporary jaundice, is due to firm spasmodic contraction of the muscular fibres which surround the lower part of the common gall-duct near its opening into the duodenum, or upon the accumulation of mucus and epithelium in the same situation, thus plugging the duct, is not quite certain; but there can be no doubt that there is in all these cases an impediment to the onward flow of the bile, consequent upon some temporary obstruction, which after a period varying from a week to three months or longer, gives way without any permanent change or derangement being induced. Patients suffering from temporary jaundice completely recover.

Now I desire to ask your careful attention to the fact that in these cases the jaundice is due not to the accumulation in the blood of substances out of which bile might be formed by the action of the liver cells, but to the passage into the blood of bile which has been already formed by the action of these hepatic elements, and has passed into the ducts.

As I have already said, the stools appear more or less like clay, or of very light brown color, in consequence of the biliary matter not having passed into the intestines, where ordinarily it undergoes those complicated changes which take place in its resinous acids and coloring matter, and which end at last in the development of the peculiar chemical compounds which are constantly found in normal fecal matter.

Even in slight cases of jaundice the bowels are usually somewhat confined. The patient perhaps experiences slight nausea, with indisposition to take food. He gets thin. The nutrient matters he does take do not nourish him properly, and he feels weak and out of health. Some people suffering from jaundice are, however, able to do their work, and students have passed through a difficult examination who were

deeply jaundiced, though the proceeding is not a wise one to permit under the circumstances.

You see, therefore, that a very large and important organ like the liver may be seriously deranged without the ordinary functions of the other organs of the body being very seriously disturbed. For a time at least we can get on not only without bile flowing into the intestine, but in spite of its distribution to all parts of the body. In these cases the bile prevented from escaping from the liver is reabsorbed and taken up by the blood, and the coloring matter deposited in many of the tissues. The patient may, however, notwithstanding this great change, be able to discharge a certain considerable amount of work, and may be able to use his mind efficiently, although the whole of the blood distributed to his brain is contaminated with a considerable proportion of biliary matter.

On the other hand, you must bear in mind that from time to time cases of jaundice are met with which end, and very quickly too, most disastrously. Now it is a fact which must not be forgotten that these cases, which run on to a fatal termination in the course of two or three weeks, cannot in their commencement be distinguished from that almost trivial form of jaundice which I have spoken of. Ordinary jaundice may last for a period varying from one week to three months. Probably the average time will be from two to three weeks. When it persists for more than a month, even though there be no grave symptoms, we feel some degree of anxiety lest the case should be due to more than a temporary obstruction of the duct. The longest case of ordinary temporary jaundice which has come under my own notice lasted for upwards of twelve weeks. For the whole of this time the patient, a young man of eighteen, was deeply jaundiced, and no decided improvement took place until three months had passed. In cases where the

malady is prolonged so considerably beyond the average time, we must suppose the plug of mucus or modified epithelium in the common duct to be firmer than usual. At last, however, the mass becomes softened, the plug escapes from the orifice of the duct, and gradually the organ returns to its normal state.

That form of jaundice which is very fatal and which may end quickly in death, is dependent upon serious damage to the secreting and other structures of the liver, and the liver-cells are often completely disintegrated and destroyed. As I said before, I do not know how we can distinguish the serious from the slight ailment when the patient first becomes jaundiced. In the fatal form of jaundice, however, very serious symptoms are developed after the lapse of a few days, and then we become aware of the terrible disease with which we have to deal. But during the first few days of the attack it is, I believe, not possible in many instances to distinguish a case which will end fatally from a case which will terminate in recovery. I allude to this matter because it is really most important not to be over-confident and offhand in forming a prognosis. You may perhaps be called to see one of these terribly fatal forms of jaundice, due to what has been called *acute yellow atrophy of the liver*, and if not aware of the existence of such cases, you might make a very sad mistake in informing the friends confidently that a really grave disease was only a slight ailment. We ought never to allow ourselves to make light of an ailment, which may turn out to be very serious indeed. Under these circumstances, we shall be deservedly accused of want of care, experience, and knowledge, and regarded as advisers lacking discretion and wisdom, and wanting in power of discerning the very serious nature of a disorder which destroys life in a very short time. On the other hand, you must be careful not to needlessly frighten people by detailing all the possi-

bilities of disaster in any given case. These serious forms of jaundice are happily very rare. In the course of a year we seldom see in the hospital more than one or two cases of the form of jaundice to which I am alluding, and several years may pass without a single case being admitted.

Ordinary temporary jaundice occurs at all periods of life, but it is most common between the ages of fifteen and twenty-four; and it is more frequently met with at this period of life in males than in females. Whether it is that we are apt to exceed in diet more than the other sex at this period of life I do not know; or whether the way we live has anything to do with it, or if we are more anxious and nervous about our work and examinations than female students, I cannot say; but certain it is that about adolescence jaundice in men is not at all uncommon.

Jaundice occurring in middle life and old age is not likely to be of this kind. It more probably depends upon some more serious change than catarrh of the gall-ducts and the impaction in the common duct of a plug of mucus. A very common cause of jaundice in middle life is a gall-stone impacted in the duct. Jaundice of this kind is usually associated with great, and not uncommonly sudden excruciating pain, and its nature can often be easily detected. This form of disease can, however, hardly be included under the head of "slight ailments," which we are now considering. You should be aware that jaundice may occur in very young children, and I have known cases in which it existed in intrauterine life. It is not an uncommon thing for the child at birth to be completely jaundiced, usually due to temporary change, but I have seen one case in which life was destroyed at or about the eighth month of intrauterine life by jaundice, caused by the impaction of a gall-stone in the common gall-duct. What is the earliest period of development at which the embryo may become affected with

this terrible malady I cannot say, but it is certain that some months before birth biliary calculi may be formed. Urinary calculi also may be produced even before the development of the organ in which they are formed is fully perfected.

Treatment of Temporary Jaundice.—With regard to the treatment of ordinary jaundice, there is little to be said. The main points to be borne in mind is that the patient should live on a light diet. Do not let him feed heavily, or he will be worse and may suffer much. Keep the bowels gently acting by giving small doses of blue pill or gray powder at intervals of a few days. You may also, or instead, occasionally give a dose of some saline purgative. A drachm or two of Sulphate of Magnesia, *Magnesia Sulphas*, with a little hydrochloric or sulphuric acid (p. 165), before breakfast is of service in this condition, just to promote the action of the bowels. Do not, however, give violent purgatives, or attempt to cure the disease offhand by any course of special treatment. A mustard poultice may be placed over the region of the liver every day, or every other day, for twenty minutes. Another local application which seems to be of use, and which I learnt from Dr. Blakiston, is Hydrochloric acid applied on rags. The strong acid is diluted with twice its bulk of water. A rag is carefully wetted with the lotion, placed over the liver, and then covered with some useless rags or an old towel. This application may be used each alternate day, care being taken that the acid is not allowed to spoil any linen or the clothes of the patient. It produces only a little tingling of the skin, which should be wiped with a soft wet sponge when the rag is removed.

I come now to another malady, reference to which may perhaps raise a smile, although it is an extremely disagreeable ailment to endure, and it may entirely prevent, or may seriously mar, the execution of mental or bodily work. I mean Sick Headache.

SICK HEADACHE.

This is one of the most severe of the maladies included under the head of slight ailments. The affection is very common, and used to be known as Migraine. Some, who in other respects are perfectly healthy persons, with apparently sound constitutions, and whose tissues generally would seem to be not only healthy but of an enduring character, suffer from very frequent attacks, or may be for many years hardly ever free from the malady. Nevertheless, sick headache is to be regarded as a very troublesome and inconvenient, rather than as a serious, malady.

This curious disorder may affect people at every period of life. Some authorities assert with confidence that, as we grow older, we overcome the tendency to sick headache, but I am sorry to say I know some who have grown old, and many who are growing old, who still suffer. One sees cases of sick headache occasionally in very young children, frequently in young people and adults, and not uncommonly in old age. I know persons of seventy-five and upwards who continue to suffer from well-marked forms of this intractable malady. However, there is no doubt that the tendency of the sick headache is to diminish in severity as age advances, so that many who are martyrs to frequent and severe attacks up to the age of twenty-five or thirty, begin to improve after that period, and towards forty become troubled less frequently, or recover altogether. In others, the attacks become rare, but occur now and then, as long as life lasts.

Sick headache is a disease not dependent upon any actual pathological change, as far as can be at present ascertained. It seems to be due to some temporary but widely-extended derangement, influencing a number of different tissues and organs situated at a distance from one another.

I shall endeavor to lay before you the several phenomena of which this malady is composed, and shall try to point out in what respects there is a departure from the normal and healthy action of the several organs and tissues involved. Now, in the first place, there is the headache. This is peculiar, for it is usually confined to one-half or less of the head, *Hemicrania* (ἡμισυς, half, κρανιον, the head). A part of one lateral half of the upper part of the head is the seat of very severe pain, and occasionally the seat of pain which is described as of a boring or penetrating character, is so circumscribed that it could be covered by the top of the thumb. Sometimes the pain is situated immediately over one brow, the sensation experienced being like that which would be produced if a sharp and strong instrument was being forced into the head at that particular spot. The pain, varying much in intensity and somewhat in character from time to time, may last for a period of from twelve to twenty-four hours, or even longer. It may then shift to the opposite side, and after lasting there for about twelve hours more, may gradually subside, until the patient becomes perfectly free from pain. In a short time he feels well, and perhaps for some days after the attack has subsided he feels unusually vigorous. From the frequency of the occurrence of cases in which the pain is confined to the region above one or other brow, the condition has been called *Brow Ague*. The term ague is, however, unfortunate, for the affection is far removed from maladies belonging to that class.

Next, as regards nausea and vomiting, which frequently accompany this headache. The stomach derangement in sick headache is often very marked and very distressing; but these symptoms are often preceded by an almost irrepressible tendency to yawn at frequent intervals. There is a sensation apparently situated in the soft palate which al-

most makes the person yield, but as soon as he has yawned once, the desire returns, and this often lasts for some hours, or until vomiting occurs or sleep is induced. There is, as I have said, almost always more or less nausea, and not unfrequently absolute vomiting, the depression accompanying the sickness being sometimes of the most distressing character. It is often as bad as a severe form of sea-sickness. I have known people to vomit fifteen or twenty times in the course of the day, although they were merely suffering from what is called sick headache. In this condition, then, we have temporary, but very decided and sometimes violent, disturbance of the digestive organs, inability to take food, nausea, and severe vomiting, associated with pain, more or less acute, on one side of, or it may be all over the head. The vomiting is remarkable, for there is not merely straining and contraction of the stomach, followed by the rejection of its contents, but a great deal of secretion is poured into the stomach from the blood or from the glands, and after this has accumulated so as to distend the organ, it is suddenly expelled. It is in this way that many of those who suffer from sick headache get relief. After the removal of the contents of the stomach, which are often of an intensely acid reaction, the distressing nausea and sense of oppression and exhaustion, become relieved for a time, but recur if more acid fluid is poured out. What is very remarkable in many of these cases is this: that food may be digested shortly before the vomiting is excited, when an enormous quantity of acid fluid from the stomach is brought up. There can be no doubt that a great deal of acid is formed in the stomach, or secreted by the glands. Indeed, at the very time food is being digested and passed onwards to the duodenum, there is evidence of the formation of other acids beside the ordinary acid of the gastric juice. Oxalic, butyric, acetic, valerianic, and some other organic

acids, are developed, owing to some unusual chemical changes taking place in the contents of the stomach.

It is the accumulation of this mixture which causes the nausea and painful sinking experienced at the pit of the stomach. The nausea remains until the contents of the stomach have been got rid of. Vomiting may, of course, be expedited by the administration of a medicinal emetic, by drinking several tumblers of warm water, or by tickling the back of the fauces. The act of vomiting may be attended with instant relief. I have known cases in which the moment after the stomach has rejected its contents, the pains have ceased, and for a time at least the patient remains in comparative ease, or feels perfectly well.

In slight sick headache, as well as more serious head affections, there is evidence of remarkable sympathy and association between the action of the brain and the stomach. The pain that we suffer in sick headache is not due merely to some affection of the cutaneous nerves of the skin of the head and face, but there is clearly some temporary derangement in the brain itself, probably in connection with the vessels of the membranes, and at least of the surface of the gray matter of the convolutions, for not only does the pain seem to be situated in the brain, but the action of the cerebral matter is unmistakably disturbed. The memory is for the time impaired. Attention cannot be given without conscious and even painful effort. Sustained thought is impossible for the time, and there is a decided longing for mental rest, which, being yielded to, soon results in dozing, or in actual sleep. It might be thought that cerebral disturbance generally, when initiated by functional or organic disease of the digestive organs, is due to deranged action of the upper part of the alimentary canal only, as the most remarkable phenomena point to stomach and duodenal disturbance, and we know that in many dis-

eases of the brain the action of the stomach especially is disturbed—frequent and sudden vomiting being often present. Unquestionably the action of the stomach is much influenced by the brain, and the latter by the stomach. Digestion may seriously derange cerebral action, and may in its turn be modified or completely interfered with by mental or emotional disturbance. All this is admitted, but in many forms of sick headache, the derangement is certainly much more general than the consideration of the subject thus far would have perhaps led you to suppose, and it is doubtful whether the lower as well as the upper part, or independently of the upper part, of the alimentary canal is not implicated in the attack, but I shall presently refer to this point more particularly.

The disturbance of the nervous system is so striking and widespread as to have led some pathologists to place sick headache among nervous diseases, and to support the conclusion that the derangement commences in the nervous system, and is essentially nervous. To me, however, it seems more probable, and the conclusion is grounded partly upon personal experience, that the nervous phenomena are secondary rather than primary in the order of their occurrence, and that the starting-point of the malady is abnormal functional disturbance in the digestive organs, and through them, in the blood.

That the blood is deranged in cases of sick headache is probable from several circumstances. Any wound or scratch that there may be on the surface looks angry. The processes of healing, and the nourishment of tissues do not proceed as in perfect health. Another reason for assuming that the blood is more or less out of order, is that when the sick headache disappears very free excretion of urine takes place. A considerable quantity, often rich in urea and urates, and of high specific gravity, is voided, and this is

succeeded by the free secretion of pale urine containing a very small quantity of solid matter. Gradually the ordinary actions in the several tissues and organs are resumed. But the composition of the blood is also much altered during the attack by the free discharge of certain substances from it into the stomach. The glands, instead of pouring out ordinary gastric juice to digest the food, secrete, and in considerable quantity, a fluid which instead of quietly digesting the food, irritates the nerves distributed to the mucous membrane and causes vomiting. The fluid is frequently highly acid, but the acidity is due to a number of organic acids which are not to be found in health. Under these circumstances it is useless to introduce food into the stomach, for little or no digestion will take place. The stomach must be allowed to rest for awhile until its contents are rejected, or by degrees driven downwards into the small intestine.

The salivary glands, the little buccal and labial glands, are also affected. Little saliva is secreted, and the mouth is often in an uncomfortable state; the mucous membrane dries very quickly; there is often an unpleasant taste, and instead of the mucous surface being soft and moist it is besmeared with viscid mucus, and the patient will tell you his mouth feels clammy. In many cases the action of the salivary glands is certainly suspended for a time, and when the attack is passing off, one of the first points noticed is the pouring of saliva into the mouth. With the return of salivary secretion, the unpleasant sensations about the mouth, the dryness, the disagreeable taste, and the clamminess disappear.

The liver is out of order in "sick headache." Its action seems to be almost suspended for a time. The excrements are sometimes, but not invariably, pale and altered in consistence. The intestine is not stimulated to perform its

ordinary contractions, and in many cases flatus collects. Moreover, the surface of the liver is tender to the touch; not unfrequently there is a feeling of fulness or actual pain in the right side and sometimes there is distinct yellowness of the conjunctiva and skin.

The action of the alimentary canal is entirely suspended for awhile, or the intestine scarcely acts at all. Its contents, in many instances, seem to remain almost still for a a time during the attack, or are very slowly urged towards the lower part of the small intestine. The action of the large bowel is suspended; there is no accumulation of fecal matter going on during the attack, for fæces are not formed.

In some cases of sick headache, I think, the derangement actually begins in the large intestine. Sometimes there is evidence of moderate, but not excessive, fecal accumulation, with a passive state of the mucous membrane and its glands, and sluggishness of the muscular coat. The cæcum and ascending colon are very commonly at fault, and I have often succeeded in feeling the accumulation in this part of the bowel. The patient himself is frequently aware of some discomfort or unpleasant sensation in the right iliac fossa. By palpation you may detect the fulness, and by tympanitic percussion over this part of the bowel you demonstrate the presence of gas, much of which probably arises from decomposition of materials which ought to have been expelled long before. Not that actual constipation has prevailed, but the bowel has not completely emptied itself. For some time, perhaps, it has not driven down the fecal matter as fast as it was received. The lower part of the ileum, as well as the cæcum, is at fault in many instances. Peyer's patches and the solitary glands do not act freely, and oftentimes their action is further disturbed by the constant presence of faulty secretion, and possibly of the prod-

ucts of fermentation and unusual chemical action, in the slowly moving and almost putrefying mass. The action of the glands themselves is then interfered with, and the uneasiness and pain which are sometimes experienced may be due to this cause. You must not forget these points, for they are of interest in connection with the causation of many slight derangements of the health, and I believe that a prolonged, and perhaps almost constantly disturbed, action of this part of the alimentary canal leads to important changes in the blood, and may establish a state of system favorable to the development of maladies of different kinds. Neither must it be forgotten that when materials remain for some time in contact with the mucous membrane of the large bowel, reabsorption occurs, and thus many noxious matters which ought to be discharged from the system, find their way into the blood.

You see, then, in sick headache there is evidence of very widespread but, at the same time, slight derangement in many organs and tissues of the body. There is general disturbance of the intestinal canal, alterations in the composition of blood, and disturbed action of many parts of the nervous system. There are derangement of touch, perverted taste and smell, often disturbance connected with vision, and not unfrequently singing in the ears, and other departures from the normal state as regards the action of the organ of hearing. The action of the heart is depressed. The capillary circulation is deranged, there being too little blood in some parts,—congestion in others. Digestion is much deranged, and the action of the liver and other secreting organs seriously impaired for the time. The muscles do not work as they should do. Delicate movements cannot be executed with the usual precision, and sustained muscular efforts are difficult or impossible. The body is

fatigued. The memory is more or less affected for a time, and in many instances the temper becomes "bilious."

To attempt brain-work when you are suffering from sick headache would be useless. The mind will not work to any advantage. Sometimes there is a very distressing faintness and a feeling of terrible exhaustion, and the heart's action is often very feeble for a time, sometimes so very weak as to cause alarm. Rest, in the recumbent posture, for a few hours may be necessary, and the heart generally will regain its usual power if let alone. Stimulants sometimes increase the stomach disturbance, and prolong the attack; but if the heart's action is very depressed, it may be desirable to administer ammonia or brandy in very small quantities at short intervals until the heart regains its natural strength.

When the attack of sick headache begins to pass off, urine, often loaded with deposits, and of high specific gravity, is excreted. Then the kidneys begin to act freely, the bowels also act slightly, and in a few hours more the patient is well. It is remarkable that after all this disturbance in the system, the individual who has suffered should be for a time in better health, and feel exceptionally well and vigorous. Indeed, you will find that many of the victims of this derangement have considerable powers of endurance, which enable them in a great many instances to work on energetically far into old age. Many who suffer severely, though not fit to perform work, by great effort may get through their duties, and perhaps during a long life may not have been forced to absent themselves for a single day. As far as I know, no harm results from working on through a sick headache in cases in which this can be done, but, of course, certain kinds of work cannot possibly be executed under the circumstances. Attacks of sick headache may occur once a week, and oftener. Not unfre

quently you will find that the suffering returns almost on the same day, after an interval of a week or a fortnight.

In spite of this almost continual disorder the phenomena of the system, essential to the continuance of life, go on perfectly well; and I think that some of those who suffer, but take moderate care of themselves, possess certain advantages as regards the prospect of longevity. Their tissues do not seem to grow old as fast as those of many more vigorous subjects. Periodical sick headaches may after all be conservative in their action, and may protect the organism from more serious pathological derangements, thus perhaps enabling persons to live long who might under other circumstances die early. Although the digestive organs go seriously wrong for a certain time, they get the advantage of rest from time to time for periods varying from twelve to twenty-four hours. If anything happens to be wrong in connection with the alimentary canal, there is the chance of time being allowed for the derangement to right itself instead of being kept up until actual morbid change has resulted. There appears to be an over-sensitiveness in connection with the nerves of the digestive organs in many who suffer from sick headache, which, by leading to severe temporary disturbance, prevents damage and permanent structural changes in important tissues. Perhaps this is the reason why many people who suffer from sick headache live to be old and retain their vigor in old age.

Some physicians have thought that an intimate relationship existed between sick headache and the epileptic state, but we meet with so many instances of each condition without the slightest indication of tendencies to the other, that I cannot, without some further evidence, accept this opinion as correct. Undoubtedly you will now and then meet with a case which might seem to justify such an inference, but you will also come across cases which, considered alone,

might suggest a relationship between epilepsy and many other forms of disease usually considered quite distinct. Indeed, there are few morbid conditions in which nerve derangement exists which might not be adduced as supporting the view of their affinity to the epileptic state. Hysteria, nightmare, waking up suddenly in the night and calling out, nocturnal expulsion of urine, twitchings occurring in the muscles, may all be regarded as belonging to the category of epileptic affections. But if I admitted this view to be probably correct, I should still be disposed to doubt whether any connection between sick headache and any form of the epileptic state had been proved to exist. Some cases that come under our notice would seem to justify the notion that, in certain instances attacks of sick headache take the place of attacks of gout, and that the two affections are related. But it must be admitted that there are many persons who suffer from sick headache who have no tendency to gout, while many who have gout have never had a headache in their lives. Nevertheless, there is reason to think that in both affections the blood is deranged, and possibly by the accumulation in it of nitrogenous materials which ought to be eliminated. Both come on at intervals, and often suddenly. Both are relieved by the same general treatment. Both are aggravated by a full meat diet, and mitigated by a diet largely composed of vegetables and fruit. In both there is derangement of the liver, and calomel and other remedies which act upon that and other excreting organs relieve those who suffer from gout as well as those who suffer from sick headache.

We cannot, I think, accept the generalization that sick headache belongs to the class of neuralgic affections; for those who suffer from severe forms of neuralgia do not seem to be more susceptible of sick headache than other persons; nor, on the other hand, are the victims of sick headache

unusually prone to neuralgic pains. Nor has the supposed connection between sick headache and ague, and maladies of that class, been proved. There seem to be an alliance between many different diseases, but it is most difficult to do more than point out the connection in general terms. As time goes on probably, may affections which have received different names, and are now regarded as distinct diseases, will be shown to be much more closely related to one another than you would be led to suppose from the accounts given in our systematic works on medicine.

Treatment of Sick Headache.—For reasons that I have already referred to, I should rather place ordinary sick headache under the head of derangements of the digestive organs than include it in the disorders of the nervous system. This question of the nature of the malady has an important practical bearing, for it must influence our views as regards treatment. Now I think I may go so far as to commit myself to the opinion, that if the digestive system and the most important organs of excretion could be made to work properly, and could be kept working properly, the subjects of sick headache would be cured, and from the time when these results had been obtained would be free from attacks.

Some of those who suffer from this unpleasant malady can tell some days before the derangement begins that they are about to have an attack. There is a disagreeable taste in the mouth, with a degree of dryness, particularly at the tip of the tongue, a feeling of distension or fulness over the stomach, sluggishness or inaction of the bowels, lassitude and an indisposition to take active exercise, slight or considerable depression of spirits, and an inclination to sleep. The appetite may still be good, but there is often some degree of discomfort after taking food, and very frequently a feeling of regret that anything in the shape of food had

been taken at the time. Now if the patient by whom the import of these premonitory symptoms is understood takes two or three grains, or even one grain, of gray power, with a little colocynth, and perhaps a saline draught the following morning, he may completely escape the impending attack. He may feel more or less out of sorts for a day or two, but he does not get the bad headache, and perhaps, also, escapes the sickness, though very likely he experiences a slight degree of nausea. This surely indicates that matters which had accumulated in the blood had been removed by the purgative, and had thus been prevented from exerting a deleterious influence culminating in the headache, and causing other symptoms.

But what should be done in these cases? What methods of treatment affords the best chance of relieving the patient who actually suffers? If you cannot always cure the patient, you may do something to prolong the intervals between the attacks, and to mitigate the severity of symptoms when they occur. If the sick headache is not bad, persuade the patient to think as little about it as possible. Recommend him to go about his ordinary work, and tell him to try by his manner to prevent people from discovering that he is ill, for too much sympathy and kind inquiry concentrates his attention upon the malady, and makes him feel worse. If anything appears to annoy him he should keep quiet, and restrain himself from expressing any decided opinion until he is well, otherwise he may get the character of being a very ill-tempered or cantankerous person, when, in truth, he is nothing of the sort. It is his headache, not himself, that does the wrong.

1. *Treatment During an Attack of Sick Headache.*

Rest.—During a severe attack of sick headache, however, the patient must have complete rest, he cannot go about, and the organs which are offending must be allowed to rest

for a time. The mind and the nervous system need repose as well as the stomach, liver, and other organs.

Starving in Sick Headache.—The patient ought not to take food, and it is very remarkable that many who suffer from this troublesome disorder are able to discharge even active duties without taking food at all, although in ordinary health the same person would get completely faint if, fasting, he attempted to do the same amount of work. A person may get up with a sick headache and be quite unable to eat any breakfast, and yet he may perform the ordinary duties of the day, and perhaps continue working up to nine or ten o'clock at night without having taken a particle of food, and yet without suffering in any way. The same man in his ordinary health might not be able to postpone breakfast for an hour without feeling excessively faint and exhausted. This state may even last for forty-eight hours, during which period not an ounce of solid food may be taken, and yet it does not follow that the nutrition of the body would be in any way impaired, or the health damaged for any length of time. The patient will not lose in weight, because the organs soon resume their natural functions. When the appetite returns and the victim is able to eat again, plenty of nutrient material is poured into the system and rapidly appropriated. Abstention from food for twenty-four hours is usually long enough to allow the organs which are deranged to right themselves. But in any case during an attack of sick headache, it is not of the slightest use to attempt to force the patient to take food. Even bread-and-butter is apt to disagree. The starchy matter of the bread instead of being digested is apt to undergo other changes, and the butter suffers decomposition, various organic acids being formed, which after a time irritate the stomach and cause it to reject its contents. Even meat is not digested, but if the patient feel exhausted a little cold beef tea may be absorbed,

or beef tea which has been half digested artificially with the aid of pepsin, p. 120. If these patients object to starve and think they will get very weak, you may tell them to try a little mutton broth or beef tea, which should be entirely free from fat, and should be sipped. Of course, as far as real advantage is concerned they might just as well do nothing, for the little that can be taken under these circumstances cannot help nutrition, but might, on the other hand, retard the return of the stomach to its normal state. The fact is, that temporary abstinence from food, as above suggested, can do no harm whatever, and is necessary if the patient desires to return to the normal state of health in the shortest time possible, and with the least degree of suffering.

Warmth.—Exposure to cold often precipitates an attack of sick headache if one is about to come on. Indeed, many sufferers attribute the illness to the direct influence of cold. I have thought on some occasions that instead of catching an ordinary cold by undue exposure, I had contracted the greater, if less lasting suffering, sick headache. Sick headache is certainly relieved by warmth. A warm bath sometimes removes the headache, and almost always gives relief for the time. In slight attacks of sick headache complete relief may be obtained by putting the feet into hot water, or even by simply well warming them before a good fire. An ordinary hot bottle, or better a vulcanized india-rubber bottle filled with hot water and applied to the stomach, sometimes appears to be of use, and is at any rate very pleasant under the circumstances.

Counter-irritation.—There is no doubt whatever that considerable temporary relief is afforded during an attack of sick headache by the application of counter-irritants. A mustard plaster (half mustard and half linseed) to the back of the neck or to the pit of the stomach will relieve the

pain, or half of one of Rigollot's mustard leaves, a piece of writing paper intervening between the mustard and the skin, may be applied in one or in both situations; but one of the best applications to be used in these cases is described on p. 201. In recommending the external application of strong acid, you must, however, always be very careful to give explicit directions, or you will get into great disgrace in consequence of the destruction of bedclothes and the serious damage to wearing apparel.

Acids.—It is curious that in many of these cases in which acids are produced in undue proportion by decomposition of various materials in the stomach, there should be a natural desire for things having an acid taste. Many persons certainly experience a distinct longing for acid drinks. Lemon or lime juice and water is very grateful to some, and seems to allay the distressing nausea often present.

Tea Drinking in Sick Headache.—Some persons sustain themselves during an attack of sick headache by drinking several cups of tolerably strong tea in the course of the day. The tea seems to keep them up, to mitigate the severity of the headache, and to relieve the nausea. Tea is condemned in the most unqualified manner by many distinguished members of the profession, but I cannot help thinking that the public forms a more correct estimate concerning the value of this celebrated infusion. I doubt whether it would be possible to persuade old women or old men, or even young men, as a class, to give up tea. The majority of people do not believe that tea does half the harm attributed to it, and I confess this is my own opinion. If, however, you were to consult many of the most distinguished members of the profession on the matter, you would almost certainly be enjoined to give up tea, whether the malady was dyspepsia, constipation, or sick headache, and, indeed, for many slight ailments the most important curative measure

would seem to be to abstain from tea, and some express this opinion with amazing confidence and absolutism. Milk and water, or wine and water, are suggested as substitutes—substitutes for tea! Your medical adviser fairly argues that something or other must be wrong, that the patient takes something that he ought not to take, that this something must be at the root of the evil, and then concludes, but not in my opinion with good reason, that the particular peccant matter is nothing less than *tea*. Now, it is almost hopeless to attempt to alter the views of those whose minds are "made up," and, as regards the deleterious effects of tea, not a few medical minds will be found in this happy state. No one is to be allowed to say a good word for tea. Tea is the almost universal cause of dyspepsia, and there is an end of the matter. But in spite of its condemnation, tea is more largely drunk than ever. Probably more than two hundred million pounds of tea per annum are consumed in the United Kingdom alone, and if its influence is so bad as some assert it to be, it is wonderful how few people discover its deleterious qualities. Seldom, I believe, does tea do the harm that has been attributed to it. In many cases of sick headache, four or five cups of good tea, at intervals during the day, will unquestionably mitigate the severity of a bad attack, and, perhaps, enable the sufferer to pursue his ordinary avocations in a way that he could not otherwise carry out. Strong coffee seems to suit some persons who cannot take tea.

Vomiting sometimes goes on for four and twenty hours, and sometimes for a longer period. The patient may be much exhausted, and the stomach become weak and very tender. Three or four days often pass before the patient regains his normal state of health and is able to digest food.

2. *Treatment in the Intervals between the Attacks.*

Now, as to the treatment in the intervals between the attacks. After having tried many different systems of diet with the view of preventing attacks of sick headache, I have come to the conclusion that, upon the whole, the best plan is to live pretty well, and not be too fidgety as regards food. In one or two days after the attack has passed off, the stomach begins to digest, and in most cases it will readily digest the ordinay things taken in health. I do not think that a restrictive diet, of any kind, is of much advantage, and if the plan adopted lowers the general health, there is no doubt that the attacks of sick headache will not only come on more frequently, but they will be more severe. I should say to those who suffer from this troublesome ailment: "Live fairly well while you can, and as soon as the sick headache comes on, entirely abstain from food for a time. As soon as the attack has passed off, live as usual, and think as little as possible of the malady." A great many persons are certainly too careful as to diet, both as regards sick headache and many other slight ailments. I fear, too, it must be confessed that many doctors encourage this, and recommend minute arrangements which are meaningless and useless. They lay down a parcel of very absolute rules for patients' guidance, many of which rest upon no principles whatever, and are but needless arbitrary enactments. If those who laid them down were called upon to give their reasons for them, they would find themselves in a very serious difficulty. Many of the very precise directions I have known to have been given to people suffering from slight ailments are really quite ridiculous. Even if some patients are a little silly, it is certainly not our duty to treat them as if they were utterly devoid of sense. Give reasonable and necessary directions as to diet

by all means, and see that patients do not exceed in any way, but do not write minute directions concerning the precise thickness of the bread-and-butter, and toast, buttered or not buttered. Such trumpery minutiæ will be regarded as feeble affectations by all sensible patients.

If people, who are merely dyspeptic or bilious or headachy, are allowed to be too particular as to what they may or may not eat, they get very fidgety, and may loathe almost all food. In consequence they soon begin to lose in weight, and simply do not get food enough to sustain them. Thus, such persons often get into a low hypochondriacal condition, and some real, and perhaps serious, illness may come on.

Many who suffer from sick headache discover, if they will only try the experiment, that they can eat pretty much as other people do, in the intervals between the attacks; and if they can manage to eat fairly well, they will find that, instead of suffering from a greater number of attacks, they escape with fewer. Sufferers from sick headache require, and can take but very little stimulant. Many are better without any stimulants whatever. Beer will often precipitate an attack, and wine usually disagrees. A teaspoonful of sherry, taken between meals, is sufficient to bring on an attack in one predisposed to the ailment. There are, however, exceptions to this, for I know some who find that a little sherry or beer helps them in the intervals between the attacks, and does not seem to bring one on unless it happens to be imminent.

Many saline medicines, which increase secretion, seem to be useful to those who suffer from sick headache. Small doses of Nitrate of Potash, *Potassæ Nitras*, Bicarbonate of Potash, *Potassæ Bicarbonas*, the so-called effervescing Citrate of Magnesia, or of *Liquor Ammoniæ Acetatis*, or *Liquor Potassæ*, may be ordered to be taken in a largely diluted state early in the

morning before breakfast, and the last thing at night. Or you may give half a tumbler of *Vichy Water* or *German Seltzer Water* at the same time of the day, for a few days at a time, in the intervals between the attacks of sick headache.

Some better preparations also seem to be of use. You may give infusion of orange, *Infusum Aurantii*, or Infusion of Quassia, *Infusum Quassiæ*, or Quinine, or, as I have suggested before, you may try the effect of tea or coffee in somewhat larger quantity than they are usually taken.

A good deal has been said lately about Guarana. It is prescribed in powder, in doses of from ten to thirty grains twice or three times a day. Its active principle has also been extracted, and may be prescribed in doses of from one to three or four grains. I am indebted to Messrs. Savory and Moore for a specimen of Guaranin. It looks something like quinine, but is more flocculent. The taste, though bitter, is very unlike the taste of that substance. Messrs. Corbyn and Messrs. Probyn have prepared a Liquid Extract of Guarana, *Extractum Guaranæ liquidum*, the dose of which is from twenty to thirty minims.

I am sorry to say that, although benefit seems to have been derived by some, many have tried this remedy without gaining any advantage from its use. Some who have long suffered from this malady, and have in course of their time tried many different plans of treatment, have at last arrived at the conclusion that upon the whole it is the best plan to live fairly well in the intervals, and take no food for twenty-four hours when an attack of sick headache occurs.

General treatment in the intervals of comparative good health must not be forgotten. Tonics of various kinds are often useful. You may give quinine in one or two-grain doses twice daily, about eleven and four o'clock, or quinine wine, or Tincture of Quinine. Various other bitter tonics and the mineral acids may be prescribed in many cases with

advantage. The above remedies must, however, be withheld when the headache begins and while it lasts.

If the patient suffers from constipated bowels, you must give mild purgatives. If the various excreting glands do not sufficiently freely perform their work, you must prescribe those remedies which act upon the liver, kidneys, or other organs at fault. Whether calomel should be given now and then is a point upon which there is much difference of opinion. Some patients undoubtedly derive great benefit from small doses of this drug. From one to two or three grains, taken at intervals of three or four days, is, I have before remarked, treatment which really deserves in certain cases to be called curative. There are, however, a few people who cannot take calomel. If you give even half a grain, the salivary glands will begin to act within three or four hours, and soon secrete violently. The saliva flows from the mouth, the tongue and cheeks swell, the teeth become loose, and the patient is in too much suffering to take food and too ill to digest it properly if he could take it. You must be aware of this extraordinary susceptibility to the action of mercury, and do not order it if the patient or friends assure you that it has this effect. Sometimes calomel seems to weaken patients terribly. Small doses purge them too much, and harm, instead of good, results. On the other hand, I can assure you that the very confident unqualified condemnation of mercurials that has lately been so fashionable rests on no foundation of fact. It is one of those fads or fancies which, being acted upon, are ever interfering with our usefulness to the sick. It is, of course, easy to bring forward numerous instances where persons have been known to take mercury almost daily for thirty or forty years, not only without suffering, but, from their own account, with great benefit. Indeed, some will tell you that they cannot get on without an occasional small dose.

Many mercury-takers have lived to be very old. I could give examples of life being prolonged to more than eighty-four, although one or two grains of blue pill had been taken every fourth or fifth day for forty years. I have been told by people that they had been distinctly warned by their medical adviser upon no account to take calomel, on the ground that if they did take the drug, it would almost kill them, or would certainly at least provoke some serious and lasting injury to tissues and organs and damage the constitution. Such assertions are purely arbitrary. It is a fact, as I have told you before, that calomel enters into the composition of many powders which have a great reputation for exerting a soothing effect upon irritable children, and which are given even to young infants for the sake of improving the temper. It is wrong for any practitioner to lay down the law against the use of such a remedy as mercury. The public are sufficiently capricious to make it difficult to advise them for the best, and it is very injudicious on the part of a skilled practitioner to encourage fancies and prejudices. Calomel, by helping the action of the stomach and liver, restores digestion, and even an infant soon regains its good humor. Adults experience a pleasant sensation if digestion goes on quietly and effectually; while, on the other hand, if the digestive process is interfered with, the most amiable persons will find it difficult to keep themselves in that desirable state. If they do not feel out of temper, they probably experience despondency and feel melancholy and out of heart.

So far the reputed substitutes for mercurials which I have tried have not succeeded as I could wish, but I have not yet had an opportunity of giving in a sufficient number of cases of sick headache and other maladies where the liver is at fault, the new remedies recommended by Professor Rutherford. Such remedies should certainly be tried in

the case of patients who cannot, or who will not, take mercury. *See* p. 195.

Drowsiness.—Patients sometimes come to consult us in consequence of a persistent sleepy state. They will tell you that they could sleep all day as well as all night. If they sit on a chair for a few minutes they drop off to sleep; if they take up a book or a paper, it soon falls from their hands in consequence of drowsiness coming on; even if they go out for a walk they soon begin to experience an almost irresistible tendency to lie down and yield themselves to sleep. Patients who suffer in this way sometimes come for help to their medical adviser. They may feel pretty well in health, with the exception of this irrepressible drowsy feeling, and they ask you what they can do to get rid of a tendency so very troublesome and disagreeable.

In many cases, this state seems to depend upon some imperfect action of the digestive organs. Sometimes it may be traced to overfeeding. Sometimes to taking too large a meal in the middle of the day. Sometimes beer is the cause of it, or a too liberal allowance of wine. If you give mild purgatives, and mineral acids and saline medicines which act upon the intestinal canal, you will often get rid of the condition, and cure the patient. When the liver is at fault, as is not unfrequently the case, you will find the advantage of giving a small dose of Calomel, Blue pill, or Gray powder, every third or fourth night, for three or four courses.

Cold bathing, also, is often useful. As soon as the patient rises in the morning he should have a cold shower-bath. There is no need of a large quantity of water. A shower-bath of two or three pints will be sufficient. If the drowsiness is very troublesome, two moderate shower-baths a day should be tried—one about eleven, the other at four o'clock—cold or tepid, according to the time of year. In some cases, in addition to the cold bathing, a mild purgative every night for a week will be found useful.

Wakefulness and Restlessness.—The very opposite condition to drowsiness afflicts some patients. They come to you complaining that they cannot sit still or rest quietly for a time. They experience a strong desire to be continually walking about. They cannot stay for long in one place, and do not feel satisfied unless they get constant change of scene. You inquire if there is any cause for this restlessness, but, as a rule, the invalid assures you that everything is going on in its usual way. But he cannot feel satisfied, quiescent, or composed. Some suffer from vague frights. When they go to bed at night, instead of dropping off to sleep in a natural way, they lie tossing about. The pillow is not comfortable, and soon gets too warm for the head. A most uncomfortable night is passed, and the patient only gets a little sleep towards morning, and wakes up from this, feeling tired, exhausted, and unrefreshed. The mental disturbance in these cases depends upon some temporary derangement which cannot be accurately defined. If upon inquiry you learn that the restless state has existed for any considerable time, you must tell the patient to thoroughly change his mode of life. If he is in business, you must recommend him to get away for a time. Send him to some place where he will get complete change of scene for a month or more. The diet should at the same time be carefully regulated, and in all probability the patient will return home well, and able to go on with his round of daily duty just as steadily as before the occurrence of the illness.

Patients oftentimes complain of feeling tired and exhausted as well as restless, and sometimes they will tell you that they cannot walk half a mile in consequence of being muscularly weak. You must carefully inquire into the state of the various functions of the body, and suggest what you can to rectify any of those which are improperly discharged. *See* p. 125. Generally, you will do well to send such patients for a moderate tour in a pleasant part of the country, where

they can see a good deal without walking very far. You must particularly caution them against over-fatigue. Many persons suffering from this or other conditions requiring change, are told to take a walking tour in Switzerland. So they go with all dispatch to their destination, and having arrived, begin their pedestrian cure. Not having been accustomed to much exertion for many years, they set to work and walk twenty miles or more a day. But instead of feeling better, and gaining strength, they soon feel terribly tired and exhausted, and return home in every respect worse than when they set out. Such an expedition is worse than useless. You must strongly impress upon such patients that they are not to walk more than a mile at first and, if tired, they should sit down; or better, lie down on the sofa and read a novel, and get into pleasant society. They should, as we say, moon about, or potter about in the open air several hours daily, without taking any active exercise. In this way, most sufferers will soon begin to improve, and then they may extend their daily walk, until they feel restored to health.

Nervousness.—There is another condition, which is usually called "nervousness." In this state there can be no doubt that the mind is somehow temporarily affected. There may be undue emotional excitement. The least thing may excite fear or dread, but instead of the nervous excited state impelling the patient to be more active in his work, he finds it almost impossible for him to discharge his ordinary duties. A large proportion of the population seems never to have experienced anything approaching to nervousness, but certainly some people do suffer from it in a terrible degree. I have been told, oftentimes, by patients, that for some time they had been conscious of an indescribable anxiety, for which they could not account, and from which by no reasoning with themselves, could they get relief.

They know there is no reason for anxiety; but nevertheless a sort of ill-defined dread seems to hang over them. They fear that something or other is about to happen, and this most painful state of mental disturbance sometimes lasts for a considerable time, causing the patient very great suffering. With this state is frequently associated great depression of spirits. The subject of it feels as if everything was going wrong with him. Although he may be getting on just as well and making just as much or even more money than usual, he feels discontented and depressed, as if something terrible were about to happen. People who suffer in this way sometimes tell you that they are certainly going to the workhouse, and all this sort of thing, although they know themselves to be actually prosperous. If a patient in this state of health should happen to lose a few shillings, he feels quite convinced that everything is going to the dogs, and nothing will persuade him to give up the despairing views of life which have thus been presented to his mind.

People who suffer from extreme nervousness, combined with a restless, unsettled state of mind, sometimes do very curious things. A man may wake up suddenly in the middle of the night with the conviction he smells fire. He immediately gets out of bed, strikes a light, goes over the house, finds nothing the matter, and goes to bed again. In another hour or two, perhaps, he wakes up a second time, and goes through the same proceedings as before. Many people whose nervous system is a little overwrought, wake up at night, and jump out of bed, and perhaps light a candle before they are quite aware of what they are doing. A further development of the same tendency may lead to sleep-walking, of which condition again there are many different degrees. Children of highly nervous temperament are very likely to suffer from attacks of chorea. These and many more severe disturbances of the nervous system seem to

depend upon a highly sensitive or excitable state of certain parts of the central nerve organs, rather than upon any abnormal or morbid changes. They are, however, often associated with a special type of organism, and very frequently it will be found that cardiac disease, affecting either the mitral or aortic orifice, or both, also exists, or is developed before the period of adolescence.

But sometimes an unusually restless and excitable state of the nervous system troubles people temporarily, and may come on at almost any period of life. The patient in such a state should be advised to visit friends, or take a holiday abroad. You should urge him to leave for a time his ordinary avocations, and very likely in a few weeks he will return free from his nervousness. Upon careful inquiry, you will find that many who suffer in this way, have been long in the habit of taking too little sleep. There is hardly anything in which individuals differ more widely from one another than in the time required for sleep. Some can do with six or seven hours, but it is quite certain that many require nine hours. Nervous people, as a rule, are benefited by a long night's rest now and then, and require an average of eight or nine hours.

Of late years, very much has been written on the subject of nervousness, and attempts have been made to show that we are much more "nervous" than our fathers were. It seems to me that the evidence adduced in favor of the statement is, to say the least, very far-fetched. The so-called brainworkers are supposed to be great sufferers. It is said that people are more sensitive to heat and cold, and require to live in rooms more highly heated than was the case even a few years ago. It must, however, be borne in mind, that a far greater number of the existing population are able to have the advantage of warm rooms in cold weather than formerly, and in consequence the majority enjoy better

health, and live to be older. That large incomes engender a good deal of fussiness, and little aches and pains which are made much of is no doubt true, and if this is "nervousness," an increase no doubt exists, and such "nervousness" will increase as prosperity increases. But I cannot help thinking that if our fathers had been as prosperous as we are, as large a percentage would have suffered from "nervousness." However this may be, it is quite certain that if our modern habits and systems are productive of increased nervousness, they are at the same time conducive to health and longevity. There is no doubt whatever that the general health of the population has improved, and is improving, that the average duration of life is on the increase, and if the sum of human happiness is not much greater every succeeding decade, it ought to be so, and the fault lies in the circumstance that individual evil inclinations are capable of overcoming highly advantageous external circumstances. Upon the whole, I doubt very much whether there is anything to justify many of the statements made about the increase of nervous disorders. Whenever money is made rapidly, luxury and folly will increase, but the silly rich after all constitute but a very small part of us—so small a part that in the life of a country like England their existence is hardly noted, except by themselves and the few whose interest it is to pander to and profit by their caprices, and minister to their requirements.

Dr. G. M. Beard, of New York, has lately called attention to the increase of nervousness in the United States, but I think his remarks can only apply to a very small portion of the population of some of the large cities. This author seems to think very much of pork as a food, and to have formed a low estimate of those whose stomachs are not strong enough to digest it. The dethronement of pork, says Dr. Beard, is having a disastrous effect upon the American people;

"pork, like the Indian, flies before civilization." Really it seems very hard that people who cannot digest pork should be put down as unduly nervous, oversensitive, and the like, and be accused of undergoing deterioration and decay. I have no doubt that the American nation will survive and increase in numbers and vigor, "the dethronement of pork" notwithstanding.

As regards the effects of overworking the brain in the case of the young, while it may be admitted that, now and then, instances of mental strain are met with, such cases are exceedingly rare, even in these days, as compared with the number of persons, young and old, who are suffering from the very opposite condition—from too little mental exertion. I should say that, as a fact, far more disease is caused by too little brainwork than by too much.

Neuralgia.—I will now offer a few remarks concerning a very important condition, which is well worthy of attentive study, but which I can now treat of only very briefly and imperfectly. Every one of you must have heard something about *Neuralgia and Neuralgic pains*, though no one has yet been able to give an adequate explanation of their causation in many cases. Sometimes these pains are no doubt due to a temporary change induced in the nerve itself, which may possibly be beyond the means of investigation. Perhaps the capillaries distributed to the nerve-fibres constituting the trunk of a large nerve may be unusually distended with blood. Possibly the circular muscular fibres of the little arteries ramifying amongst the bundles of fibres may be temporarily relaxed through nerve influence; and thus the capillaries distributed to the particular nerve or particular part of the nerve may become much dilated, and may thus press upon the adjacent nerve tubules, causing very severe pain.

That the trunk of the nerve is the seat of affection in certain ordinary forms of neuralgia is perfectly certain, for pain

like that of neuralgia may often be produced by pressing or stretching or squeezing a nerve-fibre. If a sensitive nerve-fibre be pressed upon by a tumor or growth of any kind, or be stretched over a tumor, great pain may be occasioned, and may continue perhaps for months if the circumstances causing the alteration in the nerve persist. In certain cases again the precise seat of the affection on the other hand is undoubtedly in the peripheral distribution of the nerve where it breaks up into expansions, plexuses, or networks of extremely delicate fibres.

Neuralgic pains, then, are generally associated with branches known to consist principally of sensitive nerve-fibres. Perhaps the fifth nerve is the greatest offender in these cases. You may have neuralgic pains closely resembling the pain of toothache and affecting the very same nerve-fibres, but bear in mind not due to disease of the tooth itself. The pain may be so acute that both the patient and his adviser may feel confident that some morbid change is going on in the pulp of the tooth. The dentist is consulted, and unless he is thoroughly up to his work, the tooth will be injudiciously extracted, and upon examination will perhaps be found to be in perfect health. The patient, however, goes away with the conviction that although he is minus a sound tooth, he has at any rate experienced the last twinge of pain; but alas, before many hours have passed the suffering returns as bad as ever. Torture as severe in all respects as that from which he had previously suffered is again experienced, though perhaps to the sufferer it may seem to be situated in an adjacent tooth. If the patient chose he might have one tooth exracted after another but without curing the neuralgic pain. You see, then, that extraction cannot be the proper expedient in these cases.

In some it is probable that the attack depends upon some change taking place in the circulation, and that in consequence partly of the pressure produced by the distended

capillary vessels, and partly in consequence of changes produced on the ultimate ramifications of the nerve-fibres, or on their bioplasm, and more probably on both, by exudation, pain results, and may persist for some time until the conditions become slowly altered. In a few very intractable forms of toothache or rather of neuralgic pain apparently in the tooth-pulp, it is probable that the nerve-centre is the seat of disturbance due to vascular congestion, brought about by reflex action.

In cases in which the pain depends merely upon some temporary disturbance in the branch of the fifth nerve which supplies the tooth, or in the tooth papilla itself, the probability is that it will yield to very simple treatment.

Treatment of Neuralgia.—Sometimes a good sharp purgative cures the patient at once, but more frequently it is necessary to follow up the purgatives with tonics, and especially preparations of bark, or quinine itself, a mild purgative being also given every few days. In this way you very often cure obstinate neuralgic pains. You must bear in mind that it sometimes happens that if quinine is given by itself it may under some conditions of the system increase the pain, and that for some time; while if you give a purgative in the first instance, or combine purgative medicine, such as sulphate of soda or sulphate of magnesia, with it, the quinine will often act perfectly well and cure the patient. When the pain is intense, and is decidedly a neuralgic pain, coming on at about the same time of the day, and lasting about the same length of time, you must order a considerable dose of quinine at once—five or ten grains, and then from three to five grains twice or three times a day. Some people can take as much as ten grains of quinine twice or three times a day for several days with great relief to various nerve ailments. Quinine may be given in the form of pills, or you may place the bitter powder on the tongue, or

it may be diffused through water or dissolved in water containing a few drops of free Hydrochloric, Sulphuric, Nitric, or Phosphoric Acid. The usual way of giving quinine is the last. We order a six ounce mixture as follows: Aromatic Sulphuric Acid, three drachms; Quinine, thirty-six grains; Syrup of lemon, half an ounce or more, and water to six ounces. The dose will be half an ounce, or one tablespoonful with an equal quantity of water three times a day, between meals for a fortnight.

The old *Muriate of Ammonia, Chloride of Ammonium, Ammonii Chloridum*, is a very valuable remedy in certain cases of neuralgia which are not relieved by quinine. Some consider it as a specific, and say that it seldom fails. It should be given in good doses, and it is often useless to order less than twenty grains, or half a drachm. It is not pleasant to take, as it has a peculiar salt taste which is disagreeable to most palates. However, those who have suffered much from neuralgia are usually ready to try anything that affords them prospect of relief. *Salicin* is sometimes of use, and may be given in doses of from five to eight grains every three or four hours for one or two days. *Salicylate of Soda* has been largely prescribed in the treatment of severe forms of rheumatism, and has been given for neuralgia. It is not much used in slight forms of either disease, but occasionally it does good. In many cases of acute rheumatism it acts admirably, in lowering the quick pulse and high temperature. It must be given with care, and the patient taking it must be well looked after, as sometimes it lowers the pulse and depresses the heart's action to a greater degree than is desirable.

Iron, Arsenic.—Many preparations of iron may be ordered in cases of neuralgia, particularly if there is reason to think that the state of the blood is at fault. *Arsenic* in small doses, and given with due care, may be prescribed if the pain is

very severe. It is well not to continue arsenic for more than a month at a time. You may order from three to five minims of Fowler's solution of arsenic, *Liquor Arsenicalis*, with a little syrup of ginger and an ounce of water three times daily, soon after food has been taken.

Opium.—There are several forms in which opium may be given. A small dose of Dover's powder, *Pulvis Ipecacuanhæ Compositus* (from two to five grains), at bedtime, followed in the morning by a mild saline purgative, if persisted in for a few days or a week, will relieve and sometimes cure certain forms of neuralgic pain.

Hypodermic Injection.—You may, too, inject a solution of morphia under the skin if the pains are very severe. The sixth of a grain, or less, of this drug is sufficient for subcutaneous injection. The operation is performed with the aid of a little injecting syringe made for the purpose, one of many forms of which I show you. In this way, for the time being, you may relieve the most exquisite nerve pain; but too often it happens that, as soon as the effects of the morphia have worn off, the pain returns. You must know that people are nowadays too apt to get into the way of prescribing sedatives for themselves after they have found relief, and thus they may do themselves great harm. You must, therefore, always exercise caution in prescribing and recommending this class of remedies, and be careful to tell patients they ought not to prescribe for themselves. More particularly as regards hypodermic injection, it is my duty to impress upon you the importance of not allowing the patient to get into the way of operating upon himself. There is really great danger in this, for the process is very simple and easily performed; and as the relief is certain, patients are very apt to assist themselves without waiting for the doctor. Of those who take this injudicious course, not a few get into the habit of narcotizing themselves on the

slightest excuse. If they suffer light pain they at once resort to hypodermic injection. As soon as the effects begin to wear off the pain recurs, and the dose is repeated. Soon a vicious habit is acquired, and it is difficult indeed to prevent many of those foolish persons from going to extremes and making themselves slaves of the remedy. Very painful cases of the kind come under our notice from time to time, and every now and then death occurs from an overdose, in consequence of patients who have contracted this habit of self-injection losing all control over themselves and indulging in hypodermic injection, just as other weak-minded individuals become a prey to drink and other vices. We shall have societies for the entire suppression of hypodermic injection if this treatment becomes much more fashionable than it is.

Dr. Sansom's Disks.—Of late some excellent little disks of gelatin have been prepared, each of which contains a given quantity of the drug we may desire to inject. All that is necessary is to dissolve the gelatin disk in a few drops of warm water at the time when it is required. The solution may then be taken up by the syringe and injected into the subcutaneous areolar tissue of the patient. I believe my friend, Dr. Sansom, was the first to suggest the employment of these disks, which are also used when it is required to apply atropia and other remedies to the conjunctiva. They are prepared by Messrs. Savory & Moore, of New Bond Street. Permanent *neutral* solutions for hypodermic injection are prepared by Messrs. Gerrard & Tanner, of Aldersgate Street.

Chloral Hydrate and *Croton Chloral Hydrate.*—Chloral is of great use in procuring sleep in many cases of severe neuralgia, especially when the patient has been kept awake night after night, but you must give it with the greatest care, and only order one, or at most two, doses on the prescription.

Take care also to write full directions how and when the draught is to be taken. The dose of chloral is from ten to twenty grains, with a little syrup, and peppermint or other water. The most convenient form is the syrup of chloral hydrate, one drachm of which contains ten grains of the drug. Peppermint or ginger covers the taste of the chloral better than anything else. In cases of old catarrh and emphysema it should not be given. I have seen it do harm in several instances in which the heart was weak and the right ventricle dilated.

Croton Chloral or *Butyl Chloral Hydrate*, which was much used two or three years ago, when it was first discovered, has not been heard of so much lately. It is prescribed in doses of one or two grains, to be taken every two or three hours. In the *Lancet* for January 31st, 1874, Dr. Burney Yeo reported some cases in which the remedy had been of great service in relieving very severe neuralgic pain; and in the same journal for December 2d, 1876, you will find some cases recorded by Dr. Skerritt, of Bristol, in which the remedy relieved bilious headache, facial neuralgia, and giddiness. Five grains were given twice a day. Messrs. Corbyn, Stacey, & Co., prepare a syrup of croton chloral hydrate,—pills containing two, three, and four grains each,—and a *Liquor Croton Chloral*, which contains one grain in ten minims.

Rheumatic Pains.—I must now say a few words about another kind of pain which is very common. It is, perhaps, not so severe as bad forms of neuralgic pain, but it nevertheless occasions great suffering, and is in some cases so severe and so constant as to prevent the patients from following their avocations. I allude to the so-called *Rheumatic pains*, which affect various tissues and many different parts of the body. The character of the pain differs somewhat in different cases, sometimes occurring as sharp evanescent

twinges flitting about as it were from place to place, or obstinately fixed in certain joints, and changing only in the degree of the severity of the suffering. A good many old men and old women living in damp cold country places will tell you they have been martyrs to rheumatism for more than half their lives.

Rheumatic pains are often preceded by or are associated with flatulence, heartburn, and other symptoms indicative of deranged digestion, and some suppose that the peccant matter which causes the pain is produced in the stomach, or results from unusual chemical changes occurring in the recently absorbed constituents of the food. In favor of this view may be adduced the fact that the subjects of rheumatism are almost invariably made worse by beer, while rheumatics who can be persuaded to give up this popular beverage, almost invariably improve—the rheumatism returning when the beer is resumed.

Rheumatic pains differ from neuralgic pains, inasmuch as they are commonly situated in muscles or in fibrous tissues. Neuralgic pain is usually referred to a situation where a nerve-trunk is known to pass, as in the case of the dental nerve or the superior maxillary or frontal, or certain cutaneous branches in different parts of the body. Rheumatic pains, on the other hand seem to be situated deeper, and to emanate from the ramification of nerves distributed to tendons or fasciæ, or to the muscles themselves.

Lumbago is a form, and a very unpleasant one, of muscular or musculo-fibrous rheumatism. Sometimes it is very obstinate and very difficult to treat. The patient is obliged to rest in bed, and it may be a fortnight or more before he is able to bend the back without great suffering.

The pain seems in many cases to arise near the insertion of a muscle. The point of attachment of the deltoid to the humerus is a frequent spot for the development of rheumatic

pain, so severe as to interfere with the raising of the arm, and to render the putting on of a coat without assistance a most difficult proceeding. Sometimes the pain persists in this situation for several weeks.

The intercostal muscles are not unfrequently the seat of very severe rheumatic pain which is sometimes mistaken for pleurisy. The muscles of the side and of the hip are also sometimes affected. Rheumatic pain in some of the fibres of the diaphragm and of the abdominal muscles has led to the fear that a patient was suffering from peritonitis, and some days have elapsed before this terrible and erroneous diagnosis has been corrected.

The nerve-fibres distributed to the muscular fibre cells (organic muscle) may be the seat of rheumatic pains as well as those distributed to voluntary muscle. It is to be remarked with reference to the latter, that those parts of the muscle situated nearest to the tendon are most frequently the seat of the pain. Here, of course, the circulation through the vessels is slowest and there would be the greater chance of the exudation of irritating matters from the blood, producing a deleterious influence upon the finer branches of nerve-fibres with which they come into contact.

In various forms of rheumatism, then, we infer that certain of the fibrous tissues are the seat of pathological change. Exudation is probably poured out from the blood as it slowly traverses the sparsely scattered capillaries of these tissues. The nerve-fibres close to these capillaries suffer. The exudation coagulates and part of it is at length converted into fibrous tissue, so that the affected textures become thickened and the movements of the joints and of the tendons and muscles in their neighborhood seriously impaired. In many old cases of chronic rheumatism the patient becomes seriously crippled, and the movements of some joints are greatly impeded if not altogether stopped. It would almost seem

as if in bad cases of rheumatism the fibrous tissues were the seat of a sort of slow inflammation ; and that the exudation poured out in the interstices of the bundles of fibrous tissue gradually increased in amount as the disease advanced, and that the resulting fibrous tissue underwent condensation and contraction, greatly interfering with the action of the tissues in question.

The movements of the large joints at last cease altogether ; this change being partly due to the pathological phenomena I have described, and in part to the circumstance that the pain accompanying every effort to move has gradually discouraged the patient from making any attempts. The limbs at last become quite stiff, and the patient is dependent upon others, even for every mouthful of food he swallows. We often see extreme cases of the kind in workhouses in the country. If you visit some of these institutions, you will almost certainly discover several persons, who, for many years, have been complete cripples from rheumatism, and are bedridden and quite incapable of moving any one joint in the body.

The inquiry as to the actual state of things at the seat of pain during the early stages of the disease in ordinary rheumatic affections, is an interesting one, but I am sorry to say I cannot tell you what are the essential differences between a slightly rheumatic and a perfectly healthy tissue. The facts of the case justify the conclusion that certain materials, probably soluble, are formed in undue quantity in the blood, that the solution transudes through the walls of the capillaries in situations where the vessels are few and the circulation is slow, that the contact of the fluid with the fine ramifications of the nerves close to the capillaries causes pain, that in consequence of the formation of more fluid of the same character in the blood, that which is already poured out is not easily absorbed, hence the persistent

character of the pain. Whether the actual pain is caused by the influence of the effused fluid on the fine nerve-fibres, or upon the bioplasm or living matter connected with them, is open to discussion. There is, however, no doubt that stretching of or pressure upon the terminal ramifications of nerve-fibres will give rise to pain, and it is not unreasonable to infer that fluid differing in its composition from that which bathes them in health, would also cause disturbance and pain. The mere stretching and pressure to which the nerves are subjected are not an adequate explanation in many cases, as for instance, in those where there is persistent rheumatic pain, but no tension or swelling of the tissues. The theoretical views just suggested receive support from the fact that after very free secretion has gone on for some time from skin, kidneys, and bowels, the reabsorption of the exuded fluid does occur and the rheumatic pain ceases.

With regard to the muscles there is almost invariably imperfect action, and some muscles during an attack pass into a state of complete inaction. The muscular tissue which has been many times affected by the rheumatic state gradually wastes, and the muscle itself after becoming very weak soon exhibits structural degeneration. Near the tendon the contractile tissue undergoes condensation and slowly degenerates into fibrous tissue, while in the fleshy parts adjacent, fatty degeneration may also occur. Shrinking, wasting, thickening, and contraction proceed until muscle after muscle deteriorates, and at last the limbs fail to execute their movements. I need hardly say more concerning the very serious results consequent upon the long continuance or frequent recurrence of the rheumatic state, and every one must see the importance of doing all he can to check the pathological changes, or failing this, to cause them to take place as slowly as possible, and to retard the development

of that dreadful state of helplessness and incapacity already referred to.

Measures to be Adopted for the Treatment of Rheumatism.—The first thing to bear in mind in the treatment, I may almost say of every form of rheumatism, is that the skin acts freely. Warm baths of various kinds, and in many parts of the world, have therefore been in great repute for their curative properties. The Turkish bath is often of great use to those who are troubled with rheumatic pains. It is, however, a long process, and the patient who adopts it must have two hours or more at his disposal. I know several people who take a Turkish bath twice every week, and some of them consider that they could not get on without it.

General Hints Concerning the Prevention and Relief of Chronic Rheumatic Affections.—All who suffer from rheumatic pains should be made to understand that by acting in a certain way they may greatly diminish the tendency to rheumatism if they cannot completely check it, while by acting in a different manner they may greatly encourage the progress of the morbid change. All rheumatics should be instructed concerning the great importance of promoting the free action of the secreting organs generally. Their medical adviser should particularly direct their attention to the great importance of frequent and free action of the skin, kidneys, and bowels, in order that the materials which tend to accumulate in the blood, and which are concerned in the causation of the rheumatic state, may be removed as fast as they are formed and expelled from the system.

In our climate a tendency to slight rheumatism is so common that I should say at least half the population suffered more or less. It is noticed too at every period of life. The so-called *nervous*, *neuralgic*, and *muscular pains* are very often of a rheumatic nature. These often get well of

themselves, or are relieved or removed by a purgative, by a few doses of bicarbonate of soda or potash, by one of those effervescing salines now so commonly sold, or by a few ordinary warm or Turkish baths, or, in the case of the young, by active exercise, followed by free perspiration. A somewhat more decidedly developed rheumatic condition often brings patients to us for advice, and here and there, I am sorry to say, we find this to be but the state precursory to a severe attack. In the great majority of cases, however, the morbid condition yields, in a few days or a week or two, to remedial measures based on the principles already brought under your notice.

Those who cannot or will not adopt the advice given them to take Turkish baths may, perhaps, not object to an ordinary warm bath, twice or three times a week, staying in the water from twenty minutes to half an hour, or until they perspire freely. I think the action of the ordinary warm bath in rheumatism is improved if the water be made alkaline. This may be done by dissolving in it a quarter of a pound of washing soda. The vapor bath is also of great use, and so is the hot-air bath. Very simple arrangements for vapor or hot air may now be obtained. Among the most efficient is the portable apparatus sold by Hawksley, 300 Oxford Street, London.

By free perspiration the removal from the blood of a large quantity of water, holding various substances in solution, is effected. Thus thirst is excited. The patient drinks freely of aerated or other water. In this way those noxious materials which would otherwise accumulate in the tissues are gradually removed, and the patients, perhaps, escape much suffering.

Shampooing is also of great use in slight cases of muscular and fibrous rheumatism. By pressing and squeezing the

muscles, and by rubbing the skin, the removal of fluids from the interstices of many tissues is promoted.

You know it is very important for the free action of the muscles that the fluid which bathes the contractile tissue, and which undergoes alteration during the action of the muscle, should be frequently changed. If some portions of the fluid remain in contact with individual fibres, the materials resulting from the decomposition taking place during the action of those fibres will accumulate and necessarily interfere with their free action, probably affecting the action of the nerves, and thus occasioning rheumatic pains.

You will find that generally muscular pains may be relieved by exciting the action of the skin, the bowels, and the kidneys; alkaline remedies have this effect, and are invariably useful to those who suffer, perhaps because in this condition there is an invariable tendency to the development of organic acids, particularly lactic, in the system.

Alkalies may be given in all forms of rheumatism. You may order *Bicarbonate of Potash* or *Liquor Potassæ*. These are very old remedies, and of their influence in relieving rheumatic pains there is not the least doubt. In many slight cases of pain, twenty or thirty grains of bicarbonate of potash, dissolved in two ounces of water, will be found to relieve in three or four hours. Sal volatile helps its action, and also stimulates the heart a little, and thus the blood is driven more quickly through the capillary vessels, and absorption promoted. You may order the alkali to be taken about half an hour after meals, for a week or a fortnight at a time. Now you must take care not to let a patient go on taking *Liquor Potassæ* or *Bicarbonate of Potash* from one year's end to another, or you will probably be consulted on account of the appearance of phosphates in the urine, with perhaps irritable bladder. Retention of

urine may follow, and considerable quantities of pus may be formed. Sometimes the patient becomes very low and weak, and I am not sure that serious changes in the blood, and even purulent inflammation of joints, have not resulted from the too long continued use of alkalies. *Potash* and *Soda* are very valuable remedies, if given with judgment, and if people are not allowed to go on taking them as long as they like. You must not forget to explain to people how long you wish them to continue taking any medicine you prescribe, or you will sometimes be astonished, if not alarmed, to find that a somewhat obedient patient, for whom you have prescribed a pill, has been daily taking it for years.

If a patient suffering from rheumatism finds that alkalies disagree with him, and disturb his digestion, you may try salts of vegetable acids, particularly the citrates and tartrates, for these become converted into alkalies in the system, and the urine may even be rendered alkaline by them as well as by the ordinary alkalies. Lemon and orange juice, and many fruits, also act beneficially in some cases.

Among diuretics, the ordinary Nitrate of Potash or Common Nitre—dose from five to ten grains, in water, three or four times a day; the Acetate of Potash, in doses of from ten to fifty grains, in two ounces of water, three or four times daily; the Bitartrate of Potash (*Potassæ Tartras Acida*), in doses of twenty to sixty grains or more, in two or three ounces of water, three or four times in the twenty-four hours (this salt sometimes also acts as a purgative); and the Citrate of Potash, in the same doses as the Acetate, are the most generally useful.

Guaiacum.—In former days Guaiacum was much in favor in the treatment of chronic rheumatism, and I have found benefit result from its use. You may prescribe the resin, *Guaiaci Resina*, in doses of ten grains made into pills, or

finely powdered and mixed with milk, three or four times a day, or of the *Mistura Guaiaci*, an ounce may be ordered twice or three times daily. Perhaps the least unpleasant form in which to take Guaiacum is as the ammoniated tincture, in a mixture with some bitter tincture or infusion. Mucilage and a few drops of *Spiritus Chloroformi*, with water, or peppermint, mint or other water, may be used to cover the taste.

Iodide of Potassium.—You will often find that severe lumbago pain, fixed pains in the muscles and fibrous tissues in many parts of the body, and severe chronic aching about various joints, which have troubled people for months, will be relieved by a few doses of Iodide of Potassium (*Potassii Iodidi*). You may begin with three grains, three or four times a day, and gradually increase the dose to five, six, eight, or ten grains. The iodide should be dissolved in a considerable quantity of water, and should be taken about an hour or more after meals. You may also give with it half a drachm of *Liquor Cinchonæ* (Battley's), and a few drops of *Tincture of Ginger*. Although I cannot justify the practice, on scientific grounds, I often give with the Iodide, Nitrate of Potash (five grains). The Iodide probably acts upon the painful textures, partly by promoting the absorption of exudation, but I think chiefly by taking the place of Chloride of Sodium, driving this out and thus promoting free circulation of fluids and saline matters through the interstices of the textures. Don't accept the absurd conclusion, implicitly received by many, that the beneficial action of Iodide of Potassium is evidence of the syphilitic origin of the malady. This is a great modern delusion. Some authorities attribute half the ills we suffer from to syphilis, and even think that a syphilitic taint accounts for the majority of ailments they cannot otherwise explain or account for. Both Iodide of Potassium and Bichloride of Mercury

(from the $\frac{1}{32}$ to the $\frac{1}{16}$ of a grain for a dose) are extremely valuable remedies in very many affections which are not in any way due to syphilis.

Bromide of Potassium, *Potassii Bromidum*, is useful in cases in which the rheumatic pain is in part neuralgic in character. It may be given alone, or with the Iodide, in doses of from ten to thirty grains. Salicin and Salicylic Acid, and Salicylate of Soda (see p. 233), are useful in some cases of chronic rheumatism, and quinine is frequently of advantage.

I have observed, and in many instances, that after the persistence of slight but evidently rheumatic pains for many days, perhaps for two or three weeks, the patient, without resorting to any special treatment whatever, experiences unusually free action of the skin at night. Even in mid-winter, as soon as he gets warm in bed, he sweats profusely, and for the whole night—finding his nightshirt quite moist and his skin thoroughly soft and soddened in the morning—although no change had been made in his bedclothes nor in his diet, nor had he taken any medicine whatever. The free sweating had not only come on of itself, but persisted night after night for some time. So remarkable and unusual is the free action of the skin, that oftentimes a patient is alarmed, and seeks advice with the object of stopping the cure. But, on inquiry, it is found, not only that the rheumatic pains have been much less severe since the free sweating at night came on, but that the patient acknowledges to feeling in much better health. He is in better spirits, lighter, as he says, stronger and more active. His mind clearer. His bowels act unusually well, and his water is excreted freely, is perfectly clear and destitute of the accustomed sediment. The tongue is clean and the appetite is good. But notwithstanding his conviction that he is in better health than usual, he fears the very free sweating may

weaken him, or in some way do harm, and he therefore seeks advice. Now, so far from interfering with the free perspiration, you may assure your patient that a natural cure is being effected, and that it is desirable not to stop it. After a week or two the perspiration will diminish, and the patient will feel well, and will not be troubled with rheumatic pains for some time to come. Such facts are of the greatest interest and are well deserving of your careful contemplation. We may learn from them even more than we can learn from many serious cases of disease. And though, if we act rightly, we may object to interfere, our attention is forcibly directed to certain facts which determine the treatment to be pursued for the benefit of those who are not so fortunate as to suffer a spontaneous cure.

Moderate, but habitual, natural action of the skin, liver, and other emunctories, probably prevents altogether the development of the rheumatic state. Free action for a time cures the rheumatic condition, if present, and this free action may be brought about by changes within the body. In the absence of this action, however, we endeavor by artificial means to excite it. And if the rheumatism is really severe, we should resort to the best means we possess to bring about these curative influences as soon as possible.

Questions like the following will doubtless occur to some, but I regret to say that I cannot adequately answer them: Why in some organisms only this spontaneous cure is observed? Why some never suffer from rheumatism, and so need no cure? Why some suffer terribly in spite of all measures adopted for their relief, and why some die in consequence of the extreme degree and inveterate character of the rheumatic phenomena? Some would refer the difference to difference in nerve action, and there can be no doubt concerning the amazing variation in rapidity and intensity of nerve action in different individuals. Some seem

to be "all nerve." Others appear to get on, and very well, with extremely slow and apparently blunted nerve action. Between these two extremes are to be noticed many degrees of difference. If the nervous mechanism presiding over the physiological changes in the system is well developed and highly active, derangement will be corrected ere there has been time for its existence to have been made evident to the consciousness of the individual; but when nerves and centres are dull, and small and sparse in proportion to the extent of area they have to govern, response is slow, and physiological derangement may even pass into pathological change, and result in structural alteration of a most serious and irreparable character without the patient being aware that he is even out of health. Nay, we see the most grave morbid changes running a long course, damaging in the most decided manner, it may be, many important tissues and more than one organ, and at a comparatively early period of life, although the patient has not experienced even discomfort. On the other hand, sensitive, constantly ailing people often lead long, complaining lives, and die in old age, without a single organ having passed into a state of actual disease. In the last case the patient is endowed with highly active nerve organs. In the first, very decided pathological change fails to exert any influence upon slowly acting and blunted nerve organs. In the one, broad and obvious lesions progress until action is greatly deranged or death results; in the other, illness is prevented or is self-cured before it progresses to any extent. In one case, very decided and well-timed interference at an early period, and the utmost care all through, would alone save the patient from serious disease, and perhaps death; in the other, no treatment, or only treatment of the simplest character, would be needed. Slight ailments in some organisms may cause much ado, while in others

grave pathological actions of great intensity may occur, and serious structural morbid changes run their course, perhaps, for a considerable time without being discovered, and without giving rise to any symptoms sufficiently distinct to attract the attention of the patient.

The Diet in Rheumatism should be nutritious, but care should be taken that the patient should not exceed. All rheumatics should be careful not to partake too freely of meat. Farinaceous substances and fatty matters do no harm, but while many fruits agree very well, and some, such as oranges, lemons, cooked apples, prunes, and some others, appear to be useful, sugar in large quantity is not desirable. Milk is excellent, and rheumatics may take it in quantity. Various puddings, such as batter, sago, tapioca, etc., made with milk and an egg, may be recommended. Acid wines, like the commoner forms of claret, often do harm, and indeed may occasion rheumatic pains. Beer is especially harmful, and should be invariably withheld. In treating cases of rheumatism you must impress upon patients very strongly that beer, as well as claret and some acid wines, seriously interferes with the improvement which otherwise would probably result from the remedies you prescribe. If stimulants are required at all, you may allow in the twenty-four hours two or three tablespoonfuls of brandy with seltzer or other mineral water, or the same quantity of whiskey with lemon-juice and water.

Cold, damp, ill-ventilated rooms are especially hurtful, and exposure to sudden changes in temperature often gives rise to very severe and acute attacks of rheumatism. Those who are prone to rheumatism may feel annoyed if they perspire much, and are too often unwise enough to try to check the tendency to perspiration by wearing very light clothing, and thus not uncommonly they precipitate an attack. On this matter the reader is referred to p. 106.

ON THE FEVERISH AND INFLAMMATORY STATE.

A departure from the healthy state of the blood may originate either in the circulating fluid itself or may be determined by changes in tissues and organs. The change in the blood may, in its turn, react upon and influence the action of some, and, indeed, almost all the tissues and organs in the body. When this is the case the phenomena are said to be "general," to distinguish them from phenomena of the same sort which are restricted in area, and are spoken of as "local." We may speak of general tissue changes, general fever, general inflammation, as opposed to corresponding changes or phenomena which are local, and affect only a very small portion of the body. Among the most important general changes are those departures from healthy action, known as *fevers* and *general inflammations*. So common is febrile and inflammatory disturbance that it is doubtful whether a single example could be adduced of a mammalian organism which had reached maturity without having suffered more or less from some form of such pathological changes. Few of us pass a month without experiencing, in our own bodies, some degree of febrile or inflammatory disturbance, and many are seldom free from phenomena of the kind.

Of Catching Cold.—Before bringing under your notice the actual phenomena which characterize fever and inflammation, I propose to direct your attention to the consideration of that most common of all febrile disorders, and the best known of all slight ailments—*an ordinary cold*—in the course of which a certain degree of febrile and inflammatory action invariably occurs.

Most people have "caught cold" probably many times in the course of their lives, and though they may have suf-

fered on some occasions severely, there is no reason to suppose that any tissue in the body had been damaged in the slightest degree, or any structural disease has been engendered in consequence. Whenever you are unfortunate enough to take cold, you should make the most of the opportunity and carefully study the changes as they go on in your own organism.

When the cold is coming on, you may perhaps shiver a little, or experience a creeping sensation, apparently in the skin of different parts of the body. Although you may feel quite chilly, if you place a clinical thermometer in your arm-pit, you may be surprised to discover that it indicates a rise of three or four degrees above the normal in the temperature of your body, and you will have impressed upon you the very striking and important fact that, although you feel extremely chilly and inclined to shiver and desire warm clothing, or to sit by the fire, with a good blanket over you, the temperature of the body is decidedly higher than it ought to be, and in fact has risen from a little under 98° Fahrenheit, the point at which it stands in health, to 100°, 101°, or 102°. You need not be very much disturbed or frightened if you should find that it marks 103°. You may also discover that, as soon as you get into a free perspiration, all the uncomfortable sensations will disappear. If, as soon as you feel warm, and especially if you perspire a little, you again use the thermometer, you will find that the temperature has fallen a degree or two, and after you have perspired very freely, it will fall lower still, and probably stand at the normal.

I shall endeavor to show you not only that a cold is a form of fever, but that in many colds there is evidence of a certain, and in some, a considerable degree of inflammatory action. The mucous membrane of the nasal passages, of the larynx, trachea, and bronchial tubes, of the pharynx,

and many of the small glands connected with these surfaces, are red and "inflamed." The capillary circulation in them is impeded, and there is evidence of undue action in connection with the bioplasm of the epithelium and adjacent structures.

Many of the symptoms which usher in an ordinary cold precisely resemble those which occur when some special form of fever or, it may be, severe inflammation is about to attack the patient. In the last case the shivering and other phenomena may be more severe, but the only difference is one of degree; in fact, a cold must be included in the same category as *Febrile Diseases*.

Preliminary Changes and Attendant Phenomena.—As regards the accession of a cold, or any febrile or inflammatory attack, the first indications of derangement in the ordinary processes are much the same, only varying greatly in intensity in different fevers and inflammations, according to the special form of fever or inflammation about to manifest itself, and according to the intensity of the attack which is coming on. For some little time before you "catch cold" you are conscious of not being in the ordinary state of health. Without feeling very weak or low, you are inclined to lie down, and perhaps, if you followed your inclination, you would go to bed, and in this way try to obtain relief from the discomfort and sense of general uneasiness. In a short time there is usually soreness about the nose, and this is often associated with dryness of the nasal cavity and of the throat. The tongue feels more or less dry and uncomfortable. Little or no saliva is secreted; the skin, too, often feels hot and dry. When the skin is perfectly healthy, at least in most people, it is smooth and supple, but when a cold or any general fever or inflammation is coming on, a change takes place. It becomes more or less harsh, and even rough, small particles of the outer

layer of the cuticle being partially detached, and in consequence the surface feels dry and rough. When rubbed, branlike scales of old cuticle are removed.

Very frequently the patient experiences slight uneasiness about the head, perhaps not amounting to severe headache, but a little pain, it may be, over the brow or heaviness there or at the back of the head, or in the back of the neck, or in all these situations. The pain in the neck is probably caused by some derangement affecting the nerves distributed to those muscles, by the action of which the head is raised and drawn backwards. This pain, just below the occiput, often lasts for several days, and is very troublesome. The slightest movement of the head is rendered very painful and difficult.

When a cold or fever is coming on, you usually feel weak and disinclined to take exercise. If it is necessary to walk, you have, as it were, to force yourself to do so. There is little appetite and no desire to eat an ordinary meal. You feel more inclined to take a cup of warm soup or strong beef tea, or ordinary tea or coffee, or gruel, or hot wine and water, than solid food of any kind. There is very generally indeed a demand for fluid when a cold is coming on. You feel dry and thirsty, and almost instinctively seek for water, iced water, or lemonade. It is unquestionably advantageous to take fluids when those sensations are experienced which usher in a cold in the head or other febrile attack. Although, as Dr. J. C. B. Williams long ago showed, that by resisting the longing for fluid and bearing with the thirst for two or three days, the catarrhal symptoms may be prevented or the attack shortened, the discomfort and distress are often so great that the patient prefers the cold to the suffering which results from carrying out this system of treatment for its relief or cure. And I have often thought

that in some cases the cold is cut short by taking plenty of fluid and thereby exciting free action of the skin and kidneys. The premonitory symptoms of a cold are unquestionably often much relieved by a basin of hot soup, or even warm tea or coffee. As you are probably aware, the treatment everywhere most popular is a glass of hot wine or spirits and water. You will hear in every part of the country of cases of various terrible forms of disease which have been at once stopped or cut short by a stiff glass of hot brandy, whiskey, or gin and water.

Rise in the Body-heat in all Fevers and Inflammations.—In every form of fever, and in every kind of inflammation, the temperature of the body or of the affected part, and therefore of the blood, rises. You must not forget that although, as I have said, the patient may feel excessively chilly, nay, though he be seized with decided rigors, so that he is excessively pallid, the face being pinched and destitute of color, or actually livid, and cold to the touch, his limbs trembling and his teeth chattering, the temperature of his blood will be higher than in the ordinary condition of health. So far from the blood being entirely or only affected, it is more probable that in many cases the rise in temperature begins in the tissues outside the vessels. The blood as it passes through the capillaries takes heat from one place and distributes it to other parts, so that a considerable rise in one spot may be soon reduced and diffused over a wide area, and may appear as a slight rise in the temperature of the body generally. Even in the fleabite, if it were possible to place an instrument among the distended capillaries and tissues of the affected part, the temperature, I venture to say, would be found higher than in the tissues just beyond the affected area. In extensive inflammations, as was shown by Mr. Simon, the temperature of the blood which leaves

the inflamed tissues is always decidedly higher than when it passes into them.

There is not a fever known to us in which the temperature does not rise above the normal; neither is there any inflammation which is not characterized by phenomena which occasion the development of an increased degree of heat in the inflamed part. This generalization is to be extended to all the higher animals. Every creature capable of suffering inflammation or the feverish condition exhibits during the attack elevation of temperature. There is, in fact, a very intimate connection between the increased development of heat and the states Fever and Inflammation, and we may go so far as to affirm that the existence of either of these pathological phenomena without a rise in the temperature is not possible. In both fever and inflammation it would seem that the circumstances which determine the maintenance of the equable body-heat of health are deranged, either generally as in the fever, or locally as in the inflammation. Heat is developed faster than it can be carried off, or the processes by which it is carried off are for the time interfered with, or both circumstances are concerned in determining the rapid rise of temperature which is often observed in fevers and inflammations of marked intensity,

The Body-heat of Man and Warm-blooded Animals, Fixed and Definite.—The temperature of man and the higher animals in a state of health is fixed within a very limited range, and as I mentioned in one of my early lectures, it is worthy of note that this fixed and definite temperature of the blood in the case of warm-blooded animals is maintained at the uniform standard, although the temperature of the medium in which the animal lives may vary greatly from time to time. The temperature of our body is the same in summer and winter, or at the most varies little more than a degree of Fahrenheit's scale. A man in

the Polar regions will have the same internal temperature as one living at the Equator. In the cold climate there is very little perspiration. In the hot one perspiration never ceases. By constant changes in the rate at which heat is evolved in, and carried off from the body, the internal temperature of the blood is kept very nearly uniform. It is remarkable that the limit of variation in health is so slight, for we may regard it as proved that the blood cannot vary to a greater extent than is represented by two degrees of Fahrenheit, without a departure from the normal state of health.

Whether the air be cold or hot—whether a person take violent exercise or lie quietly in a warm bed—whether food be taken frequently or withheld for many hours, the temperature will not exhibit more than a very slight temporary disturbance, and very soon return to the normal point.

Method of Ascertaining the Temperature of the Body.—The actual temperature, as indicated by the thermometer, is found to vary slightly according to the part of the body which is selected for observation. If, for example, you place the thermometer under the tongue you will find, as you would anticipate, that it will mark a degree or so higher than if the same instrument be placed in the arm-pit. In the rectum, the thermometer would mark a degree higher than in the mouth. In medical observations on the body-heat we restrict ourselves to observation in two places,—the mouth underneath the tongue, and the arm-pit. But if you try the mouth in the case of children you will not unfrequently have the bulb of your instrument bitten off. Such an accident is serious when good clinical thermometers cost from twelve to sixteen shillings each. It is, therefore, upon the whole, better to content ourselves by observing the temperature of the arm-pit only. In order that you may be able to compare the records of different

cases, you must take care to work in precisely the same way, and to place the thermometer in the arm-pit for at least two minutes if the bulb is a very small one, and for double that time if it is not of the smallest size. You will have little difficulty in using the small thermometer even in the case of the most irritable and violent children. For you can always put it in the arm-pit and keep the child's arm nearly still for the length of time required.

Thermometers for medical observation, *clinical thermometers* as they are called, may be obtained of all the instrument makers. Those with the smallest bulbs respond very quickly and come to a stand in two minutes, or even in less time; but the degrees are smaller, and they are more difficult to read as well as being more expensive than larger instruments, which require to be inserted in the arm-pit for four or more minutes before you can feel sure that the mercury has come to a standstill. Of late a great improvement has been made in the construction of the very small thermometers. The bore is so fine that observers whose eyesight was not the most perfect, often found it difficult to see the index. By grinding the glass away somewhat at the sides and making the front of a greater convexity, the effect of an elongated lens is produced, and the almost invisible mercurial thread is made to appear as a broad band of mercury, which can be seen without the slightest difficulty. These instruments may be obtained of Mr. Hawksley, 300 Oxford Street.

Further Consideration of the Essential Phenomena of Fever and Inflammation—Rigors—Hot Stage—Sweating Stage.—When a severe form of fever or inflammation is about to attack a patient, instead of mere chilliness and sensations of creeping or tingling of the surface skin, an actual rigor is experienced. This is often so intense that the patient trembles in every limb, his teeth

chatter, and he feels dreadfully ill. The very bed on which he lies may be perceptibly shaken, so violent and so general is the nerve and muscular disturbance.

Among severe inflammations, a sharp attack of inflammation of the lungs, *Pneumonia*, and among fevers, small-pox, *Variola*, and scarlet fever, *Scarlatina*, are ushered in thus. If you were called to the patient as soon as he was taken ill, you would see his limbs trembling violently, his face pale and anxious, the patient himself would be considerably depressed, suffering from nausea, and probably every now and then violent retching would add to his distress. If you put your hand on his pulse you find it quick, feeble, and small, and if you place the thermometer in his axilla, you will find the temperature higher than normal, perhaps by four or five degrees.

It would seem that at this period the blood had been diverted from the general surface of the body, and had been driven in greater quantity to the internal organs,—to the lungs, to the intestines, to the liver, and to other internal organs. These preliminary symptoms, with the shivering developed in a remarkable degree, represent what is known as the "cold stage" of the "intermittent fever." *Ague* is a very remarkable form of feverish attack, inasmuch as the several special stages to be noticed with more or less distinctness in all fevers and inflammations are developed with amazing clearness, and are well defined and marked off from one another. In the cold stage, blood not only leaves the surface, but probably parts with much of its water temporarily to the interstices of the tissues, from whence after a time it returns to the blood, or passes off by the intestines, in which case it may be removed as in Diarrhœa, or in Cholera, where, in consequence, the blood becomes of a thick and tarry consistence, so that it becomes stagnant in many vessels, and scarcely moves at all in some of the capil-

laries which are distributed to very important organs of the body.

The shivering and other symptoms which constitute the first indications of derangement in febrile diseases are due to conditions favoring the formation of deleterious matters in the blood itself, arising in some cases from changes originating in the organism, in others, in consequence of the introduction of a poison from without.

The *cold stage* is succeeded after a varying period of time by a very different state of things. The blood returns in volumes to the surface. The little arteries dilate to the utmost, the capillaries are distended, the color returns and is intensified, and the skin becomes hot to the feel, but it remains dry. There is often headache, and the patient will perhaps tell you that his head feels ready to burst. This is the *hot stage*, which is soon followed by the last or *sweating stage*. The skin becomes bathed with perspiration, which continues it may be for several hours, so that the cuticle becomes completely soddened and softened. In this way a quantity of water, with certain organic matters dissolved in it, and often amounting to several pounds in weight, is very quickly removed from the blood.

The action of the skin and other excreting organs of the body, which had been partially suspended during the accession of the attack, and in many cases for some days before, is a general fact of great importance, and marks the temporary abatement or actual cessation of all febrile and inflammatory disorders, and if these phenomena can be caused to come on somewhat earlier than in the natural course of events, the duration of the febrile or inflammatory attack is to that extent reduced. As soon as the sweating comes on the patient may feel relieved, but until it occurs he may experience much discomfort, and you may feel very anxious about the case, for you have no means of ascertaining how

bad the patient is likely to be; you do not know to what extent the grave symptoms of the malady may continue to increase, or for how long a time the patient will continue to get worse. Until sweating and free secretion occur you are hardly in a position to judge concerning the probability of recovery or the duration of the time of illness.

Of the Shivering and Rigors.—The phenomena which mark the accession of a common cold correspond to the cold stage of the ague fit, and I think it probable that the so-called collapse stage of cholera, is analogous to the first stage of the ague fit, and represents, in the most severe form they ever assume, the general phenomena which usher in every form of febrile and inflammatory attack. It is in a sudden and very severe attack of that most terrible disease, cholera, that we see the cold stage of a fever in its highest conceivable degree of development; for, in fact, the collapse is so severe and so widely spread, so manifestly affecting the action of every tissue and organ in the body, that in too many instances death results in a very short time. But this disease, like other febrile affections, has not only its cold stage. If the patient lives, the terrible collapse at length gives place to great heat and dryness of skin, and this *hot stage* in turn is followed by a *crisis* or critical change, when the kidneys and skin again resume action. The blood regains its color and freely flows through its accustomed channels, the various glands and tissues gradually recover from the shock they have suffered, and return to their normal state. The patient soon becomes convalescent.

The feverish condition which, in cholera, follows the stage of collapse after a varying interval of time, is called secondary fever. Happily few of you have seen either a case of ordinary cholera or the secondary fever, but not a few of your teachers have seen and tried to save many cases. The disease was very fatal during the cold stage, and if too

much water had been already drained off from the blood into the intestinal canal, the patient died in collapse. In some of the cases which recovered the secondary fever was so slight that it attracted no notice; but occasionally I have seen it very marked indeed, and have lost patients from secondary fever, who, some days before, had passed through severe collapse and were considered to be recovering, and I believe that this febrile stage of cholera corresponds very closely to an attack of fever, *typhus* or *typhoid* for example, and to the hot or *febrile stage* of an intermittent.

In an ordinary cold the feverish state usually lasts but a very short time, perhaps not longer than from ten to twenty-four hours. In *typhoid fever*, however, it may last for six weeks or more; and in acute rheumatism it may extend over two months. During the whole of this long period the temperature of the patient's blood may not once, for a single hour, fall to the normal standard; though in many cases it falls and rises several times in the course of the attack, passing three or four degrees above and then perhaps going down to the normal, again rising, and so on. In an ordinary cold or catarrh the chilly stage is usually followed in the course of five or six hours by free perspiration, which immediately affords great relief, and in many instances seems to cure the patient at once.

In fevers and extensive inflammations the nervous system generally is affected. In some forms the action of the brain is very much disturbed. Soon after the preliminary phenomena of the common cold have occurred, the pulse increases in frequency, and there is, possibly, severe headache, the whole of the head perhaps feeling full, almost to bursting, as if it had been forcibly distended with more than it could properly contain. The action of the mind is affected. No one when he is attacked can perform much intellectual work. His memory suffers, and to think at all is a painful

effort. He probably feels more inclined to lie down and do nothing. If he goes to bed, instead of falling asleep he probably tosses about from one side to the other in an uncomfortable way; perhaps he dreams of all kinds of horrible things, and wakes up suddenly, finding the mouth, fauces, and tongue dry and uncomfortable. There is still more or less feeling of fulness and distension about the head. The patient again tries to go to sleep, only to be disturbed by more unpleasant dreams and to wake again, perhaps frightened, in a short time.

Such are some of the broad phenomena which almost every one has experienced, who has taken a bad cold or has suffered from any form of fever. In severe and specific fevers and general inflammations, all these nerve phenomena are more strikingly developed, and trouble the patient for a longer period of time. In any well-developed fever, for instance, the patients may pass many sleepless nights. They may be restless and wakeful, and troubled with headache for a fortnight or three weeks, or even longer.

Is there Increased Oxidation in Fever and Inflammation?—This question is one of the most important in connection with the consideration of the real nature of the febrile condition. It would be answered directly and most positively in the affirmative by most pathologists, but, as we shall see, the facts known by no means justify an offhand and confident answer. The secretion from the kidneys of a person suffering from feverishness is usually concentrated and of high specific gravity. You will frequently find it loaded with urates, and often there will be *excess of urea*, and deposits of uric acid are common. The *excess of urea* is shown in a very simple way. To about half a teaspoonful of the urine in a test-tube you add an equal bulk of strong nitric acid, and plunge the lower part of the tube at once into cold water, agitating it from time to time. In the

course of a few minutes crystals of nitrate of urea will begin to form, and if the specific gravity of the urine is 1030 or more, it may seem to become almost solid from the abundant crystallization.

The circulation of the blood and the action of the various organs in the body are greatly disturbed, and there is departure from the normal state in many respects, both as regards the chemical processes going on in the blood, and the presence and accumulation in quantity in the blood of substances which ought to be removed as fast as they are formed, and in a very dilute state. Instead of which, many of the excrementitious matters are separated in so high a degree of concentration that they separate from the fluid of the secretion, and in the case of the urine some are deposited soon after it is passed and has become cool.

These and many other phenomena which are undoubtedly due to exceptional chemical change, are often set down to excessive oxidation, although a careful consideration of the facts would lead rather to an opposite conclusion, that the processes of oxidation were deficient, instead of being in excess.

In many books you are told that the increase of temperature in all fevers is due to increased oxidation, and that body-heat is invariably the result of the combination of carbon and other elements with oxygen. There is, however, distinct evidence, and of a most striking kind, that in various morbid conditions in which the temperature of the body considerably exceeds the normal, the process of oxidation is much interfered with.

If a man has one lung solid from the air-cells being plugged up with lymph poured out from the blood, as occurs in pneumonia, is it not unreasonable to maintain that oxidation is going on to a greater extent, or is more complete, than in health? Are not the air-cells filled with solid

matter, which renders the entrance of air less constant, and its renewal quite impossible? And yet we are assured that the elevation of temperature in pneumonia, and in all other febrile and inflammatory states, is due to increased oxidation, and to that alone. Again, the tissues of persons who have died from a terribly severe attack of acute rheumatism can hardly be considered to be in a state favorable to free oxidation. Nevertheless, the temperature of the body, which at the time of death may be as high as 107° or 108°, often rises three or four degrees of Fahrenheit during the first hour or two after death. How can one reasonably attribute this rise of temperature to increased oxidation? Consider not only that the rise continues for some time after the lungs have ceased to act at all, and the heart can no longer propel a drop of blood along the vessels, but that for many hours, or even days, before death the conditions of the system had been most unfavorable to the free introduction of air and its free distribution to distant parts, as also to its absorption by the tissues and fluids. Not only is the rise not due to oxidation, but we can show that, in all probability, it is due to the increased growth of bioplasm.

The generalization that the elevation of temperature in fever and inflammation is due to increased oxidation is, I think, a grave mistake, and it is, in my opinion, much more probable that the phenomenon is due to changes in the bioplasm or living matter of the blood and tissues of a nature far removed from oxidation. I shall have again to refer to this very interesting subject, and hope to consider it more in detail.

Of Free Secretion which leads to Recovery.—Lastly, recovery is associated with the gradual removal from the organism of substances which possibly have been accumulating for some time in the blood and nutrient fluids. These

substances are slowly removed by the agency of the kidneys, skin, bowels, and other emunctories. When the skin acts pretty freely, you become thirsty and imbibe a quantity of fluid, which is again quickly removed by the kidneys. The bowels act freely, although perhaps for some time before the illness and during part of the attack they had been confined, or had only acted imperfectly, especially when febrile action was most intense. The glands of the mucous membrane of the intestinal canal, like other glands, do not act as freely in the early period of a cold as they do in the healthy state; when, however, the patient returns to the normal condition these glands act freely, and the tendency to constipation and defective action passes off.

Moreover, as the feverishness abates, there will be increased action of several glands as compared with their activity in the ordinary state of health. Not only do the kidneys and the cutaneous glands act in an unusual way for some time after recovery, but the glands of the mucous membrane of the nose and those of the mucous membrane of the air-tubes also continue to act freely for some time. The quantity of secretion formed being, as we all know, much greater than it is in the normal state. Many of us while in perfect health might leave our pockethandkerchiefs behind without experiencing inconvenience, but when suffering from a cold it is well not to be neglectful. A quantity of secretion is poured out from the mucous membrane of the nose, and in many cases from that of the windpipe and bronchial tubes.

The secretion is modified mucus. In the healthy state the mucus which is formed is extremely small in amount. The mucus is principally produced in minute glands connected with the mucous membrane and opening upon its free surface. The same glands, when the fever of an ordinary cold is passing off, secrete an undue quantity of mucus.

Exaggerated action proceeds in connection with all the mucous surfaces, and particularly as regards the mucous membrane of the nasal passages. This increased secretion goes on for a certain period of time, varying from twelve or twenty-four hours to many days, and then the patient usually gets better, and everything slowly returns to its normal rate of action.

Now this very free secretion in certain cases is a matter of serious importance. There are certain forms of inflammation of the mucous membrane of the air-tubes, including the nasal passages, in which there is an undue secretion of altered mucus, amounting to six or eight ounces in the twenty-four hours. In some cases, happily not very common, an excessive quantity of secretion is very rapidly poured out, and accumulates so quickly in the smaller air-tubes that death is caused by suffocation in the course of a few hours.

The mucous membrane of some persons' air-tubes is constantly in so sensitive and irritable a state, that whenever the weather is cold they suffer more or less. The consequence is, that such patients must either spend their winter in a warmer climate, where they can be out in the open air almost daily, or remain in London and be shut up in warm rooms for a great part of the winter—a course very detrimental to the health, and likely to render the mucous membrane still more irritable and sensitive to adverse atmospheric changes as life advances.

Coryza is the scientific name for a cold associated with the secretion and removal of a considerable quantity of fluid secretion and viscid mucus from the secreting follicles and surface of that part of the mucous membrane which lines the nasal passages and adjoining cavities. *Catarrh, Gravedo* are also terms applied to a cold in the head. The word Coryza, κορύζα, is supposed to be derived from κόρος or κάρα, the head, and ζέω, to boil. I am not, however, sure whether

this derivation is perfectly accurate. The condition was, perhaps, so called because some people, suffering from a very bad cold say that they feel as if the blood in the head was in a boiling state.

On the Principles of Treatment of a Cold.—As regards treatment, I suppose many would say, "let a cold alone," "it will get well of itself," "do nothing." I am quite ready to admit that an ordinary cold will get well without any active treatment. Nevertheless, a bad cold is a very unpleasant affection in many ways, and it is very desirable to mitigate its intensity and shorten the attack, if we can do so. Besides, as I shall have to explain more fully by and by, many serious maladies in their early stage may be easily mistaken for an ordinary cold, and in many cases real advantage does result from the early adoption of judicious treatment. We will therefore endeavor to decide as to the principles according to which the treatment of a cold and allied derangements should be conducted.

The phenomena characteristic of an ordinary cold, as I have just remarked, are present during the period of accession of many forms of fever, and sometimes in a greatly intensified state. You ought, therefore, to know whether, and by what means, these symptoms may be modified, or the changes which usher in convalescence promoted, so that the latter be made to occur somewhat earlier than they would be manifested if the malady ran its ordinary course. Obviously the thing to try to do, in the treatment of maladies of the class we are considering, is to bring on the period of perspiration as early as possible, and to excite the action of the various glands of the body.

The blood has been diverted from the surface to the internal organs of the body, and we want, if we can, to determine its flow towards the skin, in order that much of its water and some of its organic constituents may be removed

by the glands and discharged in the form of perspiration. External warmth will effect this object. External warmth will relieve the feeling experienced when a cold is coming on, and I think that sometimes the malady, and possibly other severe acute affections, may be cut short in this way. The patient is told to get into a warm bed, or to take a warm bath. But the application of cold externally has been as strongly recommended as warmth, for the very same purpose in the same cases, and you might be led to suppose that here, as in some other instances, opposite and conflicting practices had been advised for the treatment of the very same malady. But this is not really so, for whether you wrap a patient in a sheet dipped in warm water or in cold water, it makes very little difference, except that a cold sheet is to the patients somewhat more disagreeable than a warm one. Cold wet packing will bring about just the same action as warm packing or a warm bath. For the chilly feeling produced by the contact of the cold wet sheet is soon followed by reaction, and is replaced by a gentle glow succeeded by free perspiration.

Diuretics.—But besides trying to excite perspiration, you may endeavor to cause other eliminating organs to act freely. You should give unirritating diuretic remedies, such as *Liquor Ammoniæ Acetatis*, *Citrate of Ammonia*, *Citrate of Potash*, *Nitrate of Potash*, and *Chlorate of Potash.* These all act more or less upon the kidneys, and increase the flow of urine; some of them act upon the skin, and in other ways promote the removal from the blood of noxious substances which have accumulated in it. They and many other remedies are thus of use in the treatment of an ordinary cold and allied ailments.

I often suggest the following prescription: Spirit of Mindererus (*Liquor Ammoniæ Acetatis*), two ounces; Spirit of Chloroform (*Spiritus Chloroformi*), from one to two

drachms; Nitrate of Potash (*Potassæ Nitras*), sixty grains; or Chlorate of Potash (*Potassæ Chloras*), from one to two hundred grains; Syrup of Orange, Squill, or Tolu, half an ounce, and water to six ounces. The dose is half an ounce, or a tablespoonful, with as much water, once in two hours, or less frequently, for three or four days.

Purgatives.—And lastly, the elimination of noxious matters which have accumulated in the blood may be further promoted by exciting to a moderate extent the action of the intestinal canal. In a cold the bowels are generally more or less confined, and in many cases there has been but imperfect action, perhaps, for some time previous to the attack. I therefore recommend you to make full inquiry upon this point, and if necessary order for the patient some mild laxative that will act upon the bowels and favor excretion. Thus you may perhaps shorten by a day or two the period of the duration of the cold. In the highly feverish condition which often comes on soon after a surgical operation, relief is often afforded in the course of a few hours by the administration of purgatives, sudorifics, and diuretics. One or two grains of *Calomel* will be found to act admirably in many of the most serious of these cases. The temperature falls soon after the dose has been taken, and the patient often experiences great relief long before the medicine begins to act on the bowels.

The fact of improvement so immediately following the use of remedies which increase the action of the skin, kidneys, and bowels, favors the conclusion that the fever is due to the accumulation of certain materials in the blood, the elimination of which is followed by the resolution of the fever. It is important to consider these matters, the more so just now, because there is too great a tendency to altogether discard the use of many medicines which are of great value in the treatment of disease.

Of the Recognition and Management of Affections which begin like an Ordinary Cold.—Many cases which at first appear to be due to an attack of ordinary cold or catarrh do not invariably turn out to be of this nature, and of these a certain number will issue in some form of serious acute disease. Those terrible fevers which occur in all the large cities of Europe, and which carry off so many thousands every year, may come on just as an ordinary cold does. During the period of accession the symptoms are much the same, and both the patient and his doctor may for some days think there is not much the matter. The patient feels so strongly convinced that he is suffering only from an ordinary cold that he goes about just as usual. But finding himself getting worse from day to day, and feeling decidedly weaker, he becomes a little anxious. He is at length obliged to take to his bed, his temperature is found to be and remains above the normal, perhaps rising to 102 and 103, and the practitioner at length becomes aware of the nature of the case. Instead of suffering from an ordinary cold, the patient has to pass through the various stages of a specific fever of a kind which is fatal in varying proportion; but under the most favorable circumstances, and with the best nursing and medical treatment, the rate of mortality will not be less than one out of every seven or eight attacked.

If you are called in just when the fever is coming on, and you thoughtlessly remark that "this is only an ordinary cold, I need not do anything," think of the dilemma in which you may be placed. You appear to have committed a very serious mistake. The patient and his friends will have, perhaps, no further confidence in you, and you may be regarded as an ignorant person who knows very little about his profession. This occasions disappointment, and you may in consequence get out of heart and feel altogether

greatly dissatisfied with yourself. As a fact it is impossible to make a diagnosis in the majority of cases at a very early period of the attack, and it is better to wait until the premonitory symptoms have passed off, or until some definite characteristics of a special malady have manifested themselves. You carefully inquire into all the facts, listen attentively to what the patient has to say concerning the symptoms which disturb him, and do all you can to relieve them, postponing any decided expression of opinion as to the precise nature of the case until your next visit, when you will probably be able to speak with decision.

If the disease should be only a common cold, you will find in practice that nevertheless many persons who experience suffering, discomfort, or even mere inconvenience, strongly desire to be relieved from their troubles, and as quickly as possible. Of the sick who send for you a considerable proportion will certainly expect that you will do something for them. Though if you were in the same condition yourself you might be inclined to leave the case to nature and not take any medicine or desire to follow any course more unusual than indulging in rest, your patient will expect you to prescribe something that will relieve him or help him to get well. Unquestionably you may help persons suffering from a severe cold by giving sudorifics, diuretics, and a gentle purgative.

Especially in the case of children is it necessary to be very cautious in committing yourself to a positive opinion at any early period of a febrile attack. You may mistake a serious case for a slight one, or the reverse. You will be astonished at the very serious aspect sometimes presented by a case of mere stomach disturbance. A child who has partaken of unripe fruit may be very ill indeed a few hours afterwards, with a temperature of 104°, flushed face, quick pulse and respiration, with a suffering, anxious look. An

inexperienced practitioner would perhaps tell the friends that some severe fever or other acute disease was certainly about to manifest itself, when perhaps a few hours afterwards the bowels act, the temperature falls to the normal, and when he next visits his patient he finds him well, and the friends laughing about his gloomy prognostications.

In children suffering from slight ailments, I have observed the temperature rise from the normal to 104°, or even higher, and descend to the normal, within twenty-four hours—so rapidly may considerable changes in the temperature of the blood of children occur. Such cases, I need scarcely say, require simple treatment. A purgative dose of castor oil is sometimes needed, and the patient is well again as soon as it operates. The child, as often happens, is very thirsty, and you may allow it to drink water. Plenty of *toast and water* may be given, or plain water if the patient likes it better, provided it has been well boiled. Water, or milk and water, will help the skin and kidneys and bowels to act freely, and in consequence the feverishness will subside, and the patient return at once to the usual state of health. Sometimes, however, a feverish attack, instead of subsiding, continues for several days. The child may be ill for a week or two, and require careful management, although no definite fever is developed. Neither scarlet fever nor typhus fever, nor any other specific disease may be manifested, but a general feverish state may be established and may continue for several days, and then gradually subside, leaving the patient thin and weak and out of health.

It must be admitted, that in former days many doctors gave too much physic, and were somewhat too fussy. In these days, however, I fear there is a tendency, if not more than a tendency, to err in an opposite direction. Some practitioners, having convinced themselves, seem to be most anxious to convince the public and the profession that the

chief duty of a medical adviser is to study, note, and carefully watch the progress of a malady,—to observe, if he is qualified to do so, the minute changes taking place in the tissues of the sick man, in order that he may discover facts which will increase our knowledge of the nature of the pathological processes, and lead to the enunciation of new principles of treatment for the benefit of sufferers in the next and succeeding generations. But this view of the aspirations of the doctor is not always appreciated by his patient, especially in cases where the visits are not purely of an honorary character, and even in this case there are patients so peculiar in their notions that they object to their bodies being used for the purposes of observation, or their sufferings carefully noted as indications of interesting pathological phenomena, which may be further studied and elucidated as the case proceeds. You must really bear in mind that the patient wants to be relieved as well as watched, and unless you can be of some use to him—unless you can advise him and help him—he may regard you as a nuisance rather than a consolation.

But further, we really ought to do all we can not only to remove bodily aches and pains, but also to relieve our patients' minds. You will not reduce the mental anxiety of a sick man if you tell him you can do nothing to remove his pain, nothing to expedite his recovery, nothing to avert impending trouble, or to mitigate the severity of suffering. I find that some doctors when they get ill, even if the illness is obviously not a serious one, become very anxious, and of all sick people they are oftentimes the most difficult to manage. They usually think themselves worse than they are, and are almost invariably desirous that something should be done. I have oftentimes ventured to discuss with a medical friend the actual nature and import of the symptoms from which he was suffering, but I generally find that

my friend is sadly disappointed if I do not propose to "do something" or suggest something to relieve him. If I remark the malady will get well of itself, he will feel disappointed, if not hurt, but if I propose a few doses of the liquor ammoniæ acetatis, nitrate or chlorate of potash, and sal volatile, a practitioner of a very philosophical turn of mind will feel quite happy, and will take the medicine ordered with regularity and cheerfulness.

I advise you to bear in mind the principle upon which the treatment of a cold or an ordinary febrile attack is to be conducted, and I recommend you to be careful not to commit yourselves too hastily to a positive opinion as to the exact nature of a febrile attack which has only lately come on. It is important not to make too light of it on the one hand, or on the other to cause needless alarm by suggesting that what is probably only a most trifling and unimportant temporary derangement may be a grave disorder.

OF THE ACTUAL CHANGES IN FEVER AND INFLAMMATION.

I now pass on to consider more particularly the actual phenomena of Fevers and Inflammations of a slight character, and the general nature of the minute changes upon which they depend.

I have said before that in all fevers and inflammations there is an elevation of temperature. Whether the rise begins in the blood or in the tissues outside the capillaries, is a question concerning which some difference of opinion may be entertained. In some cases, it is certain that the tissue elements exhibit the earliest departure from the normal state, and in all probability it is there that the rise in temperature begins. But the blood is soon affected, for in all cases the blood in the adjacent capillaries becomes hotter,

and it is by the movement of the blood that the distribution of heat is effected. But some fevers and inflammations begin, so to say, in the blood.

In every form of marked inflammation and fever, the vessels of the affected part contain more blood than they do in the normal state. Particularly the capillary vessels and the small veins are distended. If you watch the phenomena of local inflammation in one of the lower animals, as for example that form which may be excited in the web of the frog's foot by the application to one spot of a small portion of mustard for a few minutes, and carefully observe the alteration in the circulation thereby induced, you will gain much important information concerning the nature of the process. You will notice in the first place that the vessels have become much dilated, while the movement of the blood along them is getting slower and slower. At last the circulation completely stops. If at this stage of pathological change, the mustard be removed and the web be kept perfectly moist, it will be found that the movement of the blood begins again, and that much of it finds its way on to the small veins. In fact, the disturbance soon ceases. The normal state of the circulation is restored, and no damage whatever to vessels, nerves, or other tissues has taken place.

In fever there can be no doubt that the same sort of change occurs in the capillaries, but the degree of change is so slight that it is not in all cases to be demonstrated.

Some authorities consider that febrile disorders should be classed among nerve disorders, but the arguments advanced in favor of this view will also apply to the case of inflammation. But would it not be unreasonable to include fleabites, and boils, and abscesses amongst nervous diseases? In point of fact, nerves and nerve-centres are invariably affected in all fevers and inflammations however slight, for

no changes whatever, which involve small arteries, can take place in the body without nerves taking part in them,—and the essential phenomena of fever and inflammation are intimately connected with disturbed arterial and capillary action.

The phenomena of some fevers and general inflammations are due to changes which have taken place in the blood. In some there is undoubted evidence of the blood being, as it were, the starting-point of all the phenomena. The poison, or *materies morbi*, infects the blood in the first instance, and through the blood various tissues and organs suffer. It is very probable, I think, that the afferent nerve-fibres distributed to the capillary vessels are disturbed either by the action upon them of the altered fluid which transudes through the vascular walls, or by the growth and multiplication around them of minute particles of morbid bioplasm (disease germs) which also traverse the thin walls of the capillaries, thus leaving the blood and passing into the interstices of the surrounding textures. In scarlet fever (*scarlatina*) the "rash" is caused by the capillaries of the surface of the skin being dilated to such an extent that the redness of the affected parts is as intense as that of the skin of the lips in the ordinary state. The bright-red color of the skin of the lip is due, as you are probably aware, to the number and diameter of the capillaries of the modified skin of the part, and to the circumstance that these vessels are covered by a thin layer of epithelium only. In scarlet fever the redness is due to a dilatation of the vessels, somewhat like that which occurs in those of the skin of the cheek when we blush. In the fever, however, the blush lasts for a longer time. The period being, in most febrile diseases, fixed and definite, but varying considerably in duration and in the course which it takes in different kinds of fever.

In fever then, and in some general inflammations, the "eruption" or "rash" results from dilatation of the cap-

illary vessels, which lasts for a time. The mechanism instrumental in bringing about the result and the precise changes taking place in the vessels are considered in page 292. Mind, I do not say that the redness of the skin is due to increased supply of blood. Probably a less proportion of blood goes to the part than in the normal state. In a given time less blood passes along the vessels, but more blood remains in them and they are stretched. The blood is not actually stagnant but it circulates very slowly.

A slight exposure to cold may cause a febrile attack. In considering how cold operates, I think we shall find the following explanation is in accordance with the facts of the case: The heart's action being at the time feeble, blood will be flowing but slowly through the capillaries of the skin. The blood will therefore, for a much longer time than usual, be exposed to the detrimental influence of cold. No wonder that under such circumstances chemical changes of an unusual kind are induced. Substances are formed which injuriously affect the tissues and interfere with the proper performance of many of the normal phenomena of secretion and nutrition. The noxious materials dissolved in the fluid, transuding with it through the walls of the capillaries, would come in contact with the delicate nerve-fibres, and mar their action. As long as such matters remain in the blood, there must be in many ways a departure from the healthy state, but as soon as these compounds have been eliminated, the organism will be restored to its normal state. For these reasons the free action of organs concerned in excretion is of the utmost importance, and is associated with the subsidence of the fever, and the discomfort which accompanies the attack.

There are several affections which may be correctly called either *fevers* or *inflammations*. If you looked at the local phenomena only, you would use the term *inflammation*,

while to the general symptoms consequent upon the local change and varying with it in intensity, you would apply the term *fever*. Not only is inflammation the cause of fever, but fever in many cases leads to inflammation. In truth, there is no inflammation without a degree of fever, and there is no fever in which the phenomena essential to inflammation are entirely absent. That which is common to both—to all fevers and all inflammations—is the increased growth of bioplasm, consequent upon increased nutrition, and this increased growth is invariably associated with a rise in the temperature above the normal standard. *Erysipelas* may be fairly called an inflammation, though in many respects it possesses all the characteristics of a fever.

In the slightest local inflammation, however limited its area may be, a fleabite for example, the phenomena are essentially the same as in a fever, only they are circumscribed to a particular spot. If you consider the actual changes which occur in both pathological states, you will find that they approach so nearly in their essential features as to justify me in advancing the generalization that inflammation is but a local fever, while fever is a general inflammation.

If we consider the actual phenomena of fever and inflammation, as they are revealed by careful microscopical observation, we shall find that we have: 1. *Temporary enlargement or dilatation of the capillary vessels, which soon become filled with blood.* 2. *If this state of the vessels lasts for a time, exudation of fluid occurs and minute particles of bioplasm pass through the capillary walls, and grow and multiply in the new situation.* 3. *The bioplasts of the vessels, nerve-fibres and other tissues being supplied with more nutrient matter than in the ordinary state, increase in size.*

The particles of *bioplasm*, or *living matter*, in all the tissues affected are invariably enlarged in all *fevers* and *inflammations*. I believe it to be impossible for fever or inflam-

mation to occur without this enlargement of the bioplasts or nuclei,—without the temporary increase of the living matter of the part of the body affected. The living particles always experience increased nutrition under the conditions present when fever or inflammation exists, and this phenomenon—this increase of the bioplasm—is invariably associated with the development of heat. Rise in body temperature in fever and inflammation is constant, and I must ask you to note the important fact that it is associated with *slow and impeded capillary circulation, the exudation of fluid and minute particles of living matter from the blood, the increased nutrition of bioplasm.* So far from depending upon *increased oxidation*, inflammation and fever often coincide with impaired respiratory function, and the introduction into the blood of far less oxygen than in health, and with the formation and removal of less than the ordinary proportion of carbonic acid.

Slight fevers and inflammations do not necessarily result in permanent tissue changes. Many leave no traces behind them. There may be no degeneration of any tissue in the body, no structural change produced, no evidence left of the attack. After a fever or inflammation the organism may be left precisely as it was before the attack occurred. Nay, one or more attacks of feverishness during early life seems to be the rule. Almost every child suffers from several. Amongst young vertebrate animals, dogs for instance, attacks of feverishness occur in almost every individual, and are sometimes fatal. In most cases, however, the feverishness after a few days passes off, leaving no structural changes.

Of a Fleabite.—If we understood thoroughly the phenomena of a fleabite, we should know more about such serious inflammations as erysipelas than we do at present.

Possibly, also, we might be able to prevent an attack, or at least might successfully interfere with its spread.

You may remember that, in one of my early lectures, I described how by the lancet of an insect the formed material of a cell of cuticle might be easily injured in such a manner that a part of the bioplasm in its interior would be exposed, and I showed that, under these circumstances, the access of the surrounding nutrient material to the bioplasm in the interior of the cell must be greatly facilitated. It is obvious that much more nutrient matter would reach the bioplasm in a given time when the so-called cell-wall was thus damaged than when it was intact. When the formed material has been torn, nutrient fluid will pass at once to the bioplasm, and come into immediate contact with it. In the normal condition of the cell, every particle of nutrient fluid must slowly permeate the thick layer of formed material which constitutes the outer part of the cell or the cell-wall before it can reach the bioplasm and be assimilated by it. As the cell-wall consists of several layers of firm cuticular matter, not very permeable, the ordinary passage of nutrient material through it is necessarily a very slow process. But if the formed material is injured so as to expose the bioplasm, the pabulum is at once appropriated. The result is the rapid increase of the bioplasm. Outgrowths or diverticula soon make their appearance at different parts of the circumference of the mass. Some of them are from time to time detached, and being freely supplied with pabulum grow, and multitudes of masses of bioplasm quickly result. These are *pus-corpuscles*, many of which may in this way be formed in a short time from the bioplasm of an epithelium cell.

Pus may result in the course of a few hours from any form of bioplasm if it be supplied with an undue amount of pabulum. If the excess of pabulum were not taken up by

the bioplasm and converted into pus, it would become decomposed, and the products resulting from decomposition would infallibly cause the death of all the bioplasm in the neighborhood. "Mortification" of a portion of the affected tissue would result. The bioplasm of any tissue, then, as well as that forming white blood-corpuscles or lymph-corpuscles, may give rise to a form of bioplasm—pus—having common properties, irrespective of the particular form of normal bioplasm from which the pus may have been derived. The formation of pus from the bioplasm of an epithelial cell may be studied in the epithelium of the skin, in that of the air-tubes, bladder, and other surfaces. If living pus be examined, active vital movements will be observed in almost every corpuscle. *See* p. 313, *also Disease Germs or The Microscope in Medicine*, 4th edition.

But we are now chiefly concerned with the changes which occur in the skin *beneath the epithelial layer* in an ordinary fleabite. These involve vessels and nerve-fibres, and are of the highest interest. The lancet of the flea, I need scarcely tell you, goes deeper than the deepest layer of the epithelium, for it penetrates the vessels and produces changes in the capillaries as well as in other tissues of the skin. This is of importance, inasmuch as an excellent illustration of the changes which occur in inflammation of a complex tissue is afforded. Here we have a comparatively circumscribed inflammation admirably adapted for the investigation of the actual phenomena which constitute the inflammatory process as it occurs in a complex tissue, like the true skin. There is of course slight escape of blood into the adjacent tissues, in consequence of the wound inflicted upon the capillary vessels. This hæmorrhage gives rise to a very small deep-red punctum or spot, which does not disappear on pressure, called a *petechia* (from the Italian *petechio*, a fleabite), but the important fact to which I wish

to direct your attention is not the petechia caused by the escape of a minute quantity of blood, but the less intensely red area around it, which does disappear when the finger is pressed upon it, so as to drive the blood for a moment out of the distended capillaries.

A short time after the lancet of the flea has penetrated the cuticle and subjacent tissues, there appears a bright-red blush around the point which indicates the position of the wound. The area forming the round red spot, with the appearance of which most of us are familiar, is, I suppose, of the same diameter in all cases where the lancet of the flea is of the same size, and the amount of irritating poison introduced is the same.

In the case of an ordinary fleabite, then, the injury is not confined to the particular portion of tissues transfixed and injured by the lancet, but the disturbance extends some distance around. Those who have not studied fleabites should do so, and you will find abundant opportunities in the wards of the hospitals for the observation of fleabites in every stage of change—from the most recently inflicted injury to the case in which the redness is disappearing and the bright-red tint giving place to the ordinary color of the adjacent skin.

If in a recent bite you carefully notice the redness, you will observe that the red blush ceases at a definite line; the red tint does not gradually shade off into the hue of the surrounding skin, but the red limiting line is abrupt, and, if the skin happens to be pale, what is seen is a little circular patch, about the one-eighth of an inch or more in diameter. The area is of a bright-red color, almost as red as the cheek, and if you look closely you may often see a spot in the centre, which is the perforation made by the lancet of the animal, rendered evident by the passage into it of a little blood. Now there is no doubt that the redness de-

pends upon the distension of the capillaries by blood. They contain much more blood than they do in their usual state, but, as regards the precise manner in which this redness is produced, there is room for some difference of opinion, and we have yet much to learn in connection with this interesting phenomenon. There can be no doubt, however, that the capillary vessels of the skin, over the area of redness, are dilated. These capillaries contain twice or three times as much blood as the adjacent capillaries of the skin around the red spot. Now you are probably aware that when we blush the capillaries of the skin of the cheeks are suddenly distended, and their diameter, of course, is considerably increased. If it were not so, the difference in the quantity of blood would not be sufficient to produce the degree of redness which is so remarkable.

The area of redness consequent upon a fleabite is due, not to corresponding extravasation of blood, but merely to the temporary dilatation of the vessels of the parts. You see, then, that an instrument which is much less than the smallest needle, having passed directly through the skin, has quickly led to dilatation of the capillary vessels for a certain distance, perhaps the one-sixteenth of an inch or more, around the line of perforation; but none of the vessels beyond the circumscribed line are dilated, though they freely communicate with the dilated vessels. Does this action depend upon some influence exerted upon certain fine nerve-fibres lying in the course of the wound, or is it due to any direct influence upon the vessels themselves? This last suggestion may be dismissed at once, because by no direct influence upon vessels of which we have knowledge can such a phenomenon be produced. There is, in my opinion, no doubt whatever that the change in the diameter of the vessels is occasioned by injury to the nerves, and it is probable that the true explanation is, that the conges-

tion of the capillaries depends, not upon injury done to nerves by the passage of the lancet of the flea, but upon the influence exerted on the nerves in consequence of the escape of a small quantity of irritating poisonous material, which is extruded at the same time, and poisons and irritates the nerves in the course of the wound and those at a short distance around the line of penetration.

Alterations of Calibre of the Small Arteries.—The redness of the fleabite is due to dilatation of the vessels, but what is very remarkable and of great interest is this,—that the little arteries which communicate with and supply the capillaries with blood are dilated to a *certain definite* extent, as you may convince yourselves by trying the following little experiment. Press the finger firmly upon the skin corresponding to the fleabite and skin around it, so as to drive the blood from the distended vessels into the neighboring capillaries. The whole of the skin subjected to pressure of course becomes perfectly pale, the area corresponding to the fleabite being as pale as the skin around, from the capillaries of which the blood has been temporarily driven. Now a few seconds after the finger has been removed, the blood streams back into the vessels of the area of the skin rendered white by the pressure, so as to restore the exact tint which existed before. The fleabite will re sume the precise degree of redness it had before pressure was applied, being neither paler nor darker. The pressure has caused only a temporary change. Although the blood had been completely squeezed out of the capillary vessels, the moment it is allowed to return it fills these vessels and distends them to precisely the same degree of dilatation as before.

By this simple experiment we prove conclusively not only that the capillary vessels are dilated, but dilated to a definite

extent, so that every capillary resumes the same diameter, and is capable of retaining this, at any rate, for some hours, although the blood may be thoroughly squeezed out and allowed to run back again as often as you please. How is this brought about? By what mechanism is it effected, and how can the phenomenon be accounted for? The change is complex and not to be explained in few words, but as it illustrates some very important physiological and pathological principles the matter is well worthy of your attentive consideration. In the first place, we must take note of the conditions which determine and regulate the flow of blood at a certain rate through the capillary vessels, and these are somewhat complex.

The capillaries are elastic vessels, which have no power, as far as is known, of active contraction. They can be distended, and they will recoil or contract, so as to be very much less than their ordinary diameter; indeed they may be so reduced as to appear like mere lines, their cavity being for the time obliterated and not a blood-corpuscle passing through them. Nevertheless the capillary has no active power of contraction or dilatation. The thin walls are eminently elastic, and they yield if blood or other fluid is forced by increased pressure. The little arteries are first distended and enlarged, and then the capillaries. If the diameter of the arteries becomes reduced, the capillaries shrink. These phenomena are repeated whenever the pressure by which the blood is forced into the vessels is reduced or increased.

The Degree of Contraction of the Minute Arteries Determined and Maintained by Nerve Action.—And now as to the vessels which pour their blood into the capillaries. The little arteries, we know, are capable of undergoing very great alterations in calibre, but the alterations are of an *active*

character. By *active* I mean that the diameter of a small artery can be maintained for a time at a certain uniform degree, the canal being completely obliterated, or increased to twice the area of its usual section, or half the area; and this irrespective of any temporary changes produced by mechanical pressure applied from time to time.

The smaller arteries are encircled by numerous muscular fibres, placed as close as possible to one another, often consisting of very many layers, and which constitute the greater part of the thickness of their walls.

When the encircling muscular fibres contract, the tube of the artery is of course diminished. When the muscular fibres undergo relaxation, the tube of the vessel will be enlarged.

The calibre of the artery is of course entirely dependent upon varying degrees of contraction or relaxation in the contractile fibres taking place from time to time. This is not a passive change, like the mere dilatation and recoil of the elastic capillary vessels, but a change due to varying degrees of contraction or relaxation of the muscular fibres which encircle the tube, and which may be retained at a precise point without the slightest variation in extent or intensity for a considerable time. The contraction of the muscular fibres may even remain constant in spite of an alteration in the pressure by which the blood is driven into the tubes.

Next, we must inquire by what means a definite degree of contraction and relaxation of the muscular fibres of the little arteries is determined. It has been conclusively proved, partly by the results of experiment and partly by reasoning upon arrangements of nerves and muscular fibres demonstrated by microscopical investigation, that the wonderful changes in question are brought about through the instru-

mentality of nerves and nerve-centres. For every set of minute arterial vessels there is no doubt a nerve-centre, and by alteration in the condition of this nerve-centre the calibre of the little arteries, or, in other words, the degree of contraction of the muscular fibres of their coats will be determined. Each nerve-centre is connected with others by intercommunicating fibres, so that a very few arteries may have their calibre altered, or the change may occur in hundreds and thousands of vessels, distributed to a large extent of tissue at the same moment.

Now do not suppose this is all grounded on mere theory. Everything I am telling you is based on observation and experiment, and I shall show you the nerve-fibres concerned. We can easily demonstrate the muscular fibres of the minute arteries of the body of man and vertebrate animals generally. We know, too, that there are nerves abundantly distributed to these arteries, and that the nerves are connected with ganglia.

Of the Ganglia Governing and Regulating the Calibre of the small Arteries.—The nerves of the small arteries originate in nerve-centres, and I have in very many instances followed fine nerve-fibres for long distances from the walls of the arteries to their connection with an individual nerve-cell in the nerve-centre.

The nerve-centres connected with these and other nerve-fibres concerned in governing the vascular system, are extremely numerous. The arrangement of the centres or ganglia, and of the entering and emerging nerve-fibres, can be most easily investigated in the coats of the intestine of any small animal, but for the study of the structure of the nerve-cells themselves, the little green tree frog (*Hyla viridis*) should be selected. If you examine the mesentery near the intestine and the areolar tissue in the back part of the ab-

dominal cavity, you will find the ganglia as numerous as is here indicated (drawing shown). If you take a portion of the mucous membrane of the small intestine of man, or one of the higher animals, say not more than a quarter of an inch square, and prepare it carefully, you may find from half a dozen to a dozen or more ganglia. Each ganglion will contain from two or three to two or three hundred cells; and every individual cell has at least two fibres issuing from it.* By this investigation you will be able to gain a correct notion of the general nature and structure of the nervous apparatus which exerts an influence upon every part of the vascular system, the nerves of which are distributed to the walls of the small arteries, veins, and capillaries, and in certain cases to the tissues which intervene, or which are adjacent to capillaries.

The system of ganglia and intercommunicating bundles of nerve-fibres exists in every part of the intestinal canal of man and the higher animals, and as regards the distribution of nerves to vessels, the general arrangement prevails in all the smaller arteries of the body. For although no nerve ganglia exist very near the ultimate distribution of the nerves to the small arteries of the skin of the body and to the tissues of the limbs, we know that these nerves are all connected with nerve-centres exhibiting the same general structure and arrangement as those found in connection with the mucous membrane of the intestines and other viscera of the abdomen and thorax. All belong to the so-called sympathetic system. Nerve-centres or ganglia are placed in certain special parts of the trunk, and from these bundles of nerve-fibres are derived which are distributed to the vessels of the head and extremities. The vessels dis-

* Phil. Trans., May, 1863.

tributing blood to the muscles of the limbs, to the large nerves, to the brain and spinal cord, and their membranes, are as much under the influence of nerve ganglia of the sympathetic system, as are the arteries of the lungs, the heart, the liver, the kidney, and other secreting organs.

I propose now to describe more fully the mechanism by which the varying calibre of the small arteries is determined. You will form a correct idea of the degree to which little arteries may contract if you take note of what is represented in this drawing (not introduced in this work) of the arteries of the pia mater of the common sheep, which were injected immediately after the death of the animal, with Prussian blue fluid. (For the composition of this fluid and the method of injecting, see *The Microscope in Medicine, or How to Work with the Microscope.*) The walls of the vessels, with their muscular fibre-cells, are well shown The little arteries at the time of death contracted irregularly. You see in one place the muscular fibres of a considerable length of the vessel have vigorously contracted, so as to obliterate the canal. Very few blood-corpuscles could have passed through this part of the vessel at the time of the contraction of its muscular fibres. This finely contracted portion of the little artery is as you see immediately continuous with another part of the vessel where the coats are relaxed, and the diameter of the tube would be perhaps twenty times that of its continuation in the contracted portion of the vessel. Many different portions of small arteries in various degrees of contraction are represented in different parts of the drawing.

We must yet go somewhat more into detail before we can adequately explain the changes which take place in the coats of the small arteries during life, by which variations in their calibre are determined, and which are intimately connected

with the phenomena of the fleabite. I must here remark, that the arteries are not the only branches of the small vessels which are supplied with nerve-fibres. It has long been known that the small veins are freely supplied with nerve-fibres, but their general arrangement has not been fully investigated. They exist in great number—in greater number than one would expect, considering the paucity of the muscular fibres and the thinness of the coats of the vessel. But besides the distribution of nerves to small arteries and veins, we must study the arrangement of the nerve-fibres belonging to the capillary vessels.

Of the Nerves to Capillary Vessels.—As far as I am aware, you will not find it stated in any of your textbooks, even at this time, that nerve-fibres are distributed to capillaries; but not only is this the fact, but upon many capillaries a considerable number of fine nerve-fibres may be seen to ramify. As long ago as 1860, I succeeded in tracing a new set of nerve-fibres, which had not been previously described, to the capillary vessels. Numerous observations upon the capillary vessels of all classes of vertebrata have convinced me that the capillaries generally are freely supplied with nerves, or, to speak more correctly,—that just outside, or at a short distance from the outer surface of the walls of the capillaries, very fine nerve-fibres exist, which in many cases form a lax network or plexus of extremely delicate nerve-fibres on the outer surface of the vessel.

The fact is not of anatomical interest only, but has an important bearing upon questions of action during life. Upon carefully examining capillaries in many tissues of the frog, according to the plan I have described (*The Microscope in Medicine, or How to Work with the Microscope*), you will meet with little difficulty in demonstrating the nerve-fibres to capillary vessels. I could show you more than

twenty preparations from the frog in which branches of nerve-fibres and capillary vessels are seen, without the slightest doubt. The fact cannot be explained away. There is no doubt whatever about the delicate fibres in question being nerves, for in many instances I have traced the fibres from their distribution outside the capillaries to the ganglion cell, without one break in the continuity of the matter of which they consist. But many are not satisfied that a structure which may be demonstrated in a cold-blooded vertebrate like the frog, also exists in the higher vertebrata and in man. I have, however, not only demonstrated nerves to capillary vessels in several mammalian animals and birds, but have been able to preserve several specimens permanently. One of the best animals for the purpose is the white mouse, because there is very little connective tissue to obscure the extremely delicate nerve-fibres; but, upon the whole, I prefer the bat's wing; and of the arrangement of the nerves upon the thin membrane of this wonderful organ I have preserved several specimens.

Of Demonstrating the Nerves Distributed to Capillaries.— In order to see the delicate nerve-fibres and the capillary vessels, it is necessary to obtain a structure in which the capillaries themselves can be seen without much dissection, or the necessity of section cutting. If you have to dissect the tissue, you tear the capillaries, and cannot follow the nerve-fibres for any great distance. In the bat's wing, and also in the bladder of the frog, you have a natural dissection almost ready for observation. (Arrangement shown in several enlarged copies of drawings.)

Of the arrangement of nerve-fibres in a tissue, a considerable extent of which is altogether destitute of capillary vessels, one can hardly point to a better example than is to be obtained in the cornea of a small animal, particularly the hyla or little green tree frog. The nerve-fibres in this

transparent fibrous tissue are exceedingly numerous, forming extensive networks of wonderfully delicate nerve-fibres, with which, at short intervals, small masses of bioplasm are connected, from which the fibres grow. A thin section, which includes the anterior surface of the cornea (placed uppermost so as to be just beneath the thin glass cover) is most favorable for observation. High powers may be used (from 300 to 1200 diameters). In such a specimen you can trace all that is represented in the drawings. The nerves divide and subdivide at short intervals, and extensive networks of excessively fine fibres are formed, which lie on different planes, and are to be found in every part of the corneal tissue, though the networks are more numerous near the anterior surface than in other parts. These nerve-fibres might be regarded as extensions of those belonging to capillary vessels, though at the margin of the cornea they are continuous with the latter, but their general disposition and appearance are very similar.

Of the Mechanism by which the Capillary Circulation of Man and Animals is Regulated.—My chief object in troubling you with this somewhat detailed anatomical description is, that I may be able more clearly to explain the probable action of these fine nerve-fibres distributed to the capillary vessels, and the very important office they perform during life. It is true that all this belongs strictly to the domain of physiology, but as the inquiry has a most important bearing in connection with the determination of the nature of the phenomena occurring in the simplest pathological changes—in a fleabite, for example, I need make no apology for referring to it here. Without the facts and inferences deduced from these observations, I am unable to explain to you the phenomena of inflammation or fever as they occur in man and warm-blooded animals.

The greater part of the nerve circuit, which I have endeavored to depict, has been demonstrated by actual observation, but there is a break or hiatus as regards the connection of the particular fibres distributed to the artery and those to the capillary, with the nerve-cell. One cannot identify the afferent fibre and the efferent branch connected with the very same cell, as is here represented. There is no doubt whatever concerning the existence of two fibres in connection with each nerve-cell in any nerve-centre. As I have already stated, there is no doubt of the connection of one of these fibres with the nerve-fibre which is distributed to the artery, for that has been demonstrated. The ramifications of the fine nerve-fibres upon and amongst the muscular fibres of the artery have also been demonstrated in numerous specimens from representatives of the different classes of Vertebrata, p. 285. I have not succeeded in tracing the nerve-fibres from capillary vessels to the same identical nerve-cell as that from which the nerve distributed to the artery subdividing into the capillaries takes its rise. I consider the arrangement to be as follows: The very fine nerve-fibres which I have shown to be distributed to capillary vessels are probably *afferent*. These transmit impressions from the sides and immediate neighborhood of the capillary vessels, and from the tissues between the capillary vessels, to the nerve-cell. In the cells of the nerve-centre a change takes place whenever the peripheral ramifications of these afferent nerve-fibres from the capillaries are irritated. In consequence of this change effected in the nerve-centre, an impulse to movement is transmitted by the nerves which are at length distributed to the muscular fibres of the little artery, and the muscular fibres contract. The calibre of the artery is at once reduced, and the blood stream which flows onward into the capillary vessels is diminished; or,

in other words, the quantity of blood passing to a given area in a given period of time is much reduced.

Under other circumstances the nerve-fibres distributed to the capillary vessels, instead of being irritated, experience a paralyzing influence, in consequence of which a corresponding action is produced in the nerve-centre, and, instead of contraction, we have relaxation of the muscular fibres of the little artery; and the quantity of blood passing through the vessels within a given period of time must be increased to an extent proportionate to the increased diameter of the vessel. Here, then, is a self-regulating nervous mechanism connected with the distribution and regulation of the blood-current in the capillary vessels of the body of a most efficient kind, coming into action on the slightest change in the equilibrium of activity either at the peripheral distribution of the nerves or in the nerve-centres connected with them. The quantity of blood passing through these vessels can be regulated to a nicety. The stream may be increased or diminished suddenly, or a uniform flow maintained for a considerable period of time. These changes are brought about solely by the influence of the nerves in determining the degree of contraction of the muscular fibre-cells which encircle the artery.

Let us now apply what we have learnt to the phenomena of the fleabite: When the lancet of the flea, after penetrating the cuticle, reaches the capillaries of the skin, some of the fine nerve-fibres distributed to the capillaries are severed, others being no doubt stretched or pressed upon by the blood and fluid which escape from the vessels, and in consequence of the distension which the latter undergo. The result is a relaxing or paralyzing action. The muscular fibres of the little arteries yield, and become flaccid and elongated. The diameter of the tube of the vessel becomes largely increased. A greater quantity of blood, therefore,

flows into the capillaries, and they become distended. This action probably depends partly upon severance of fine nerve-fibres by the cutting action of the lancet of the animal, and is in part due to the influence of poison expelled at the moment, which spreads for a short distance among the elements of the adjacent tissues, perhaps acting chemically on the nerve-fibres or on their bioplasm.

But what is highly interesting and very remarkable is this: The relaxing or paralyzing action is exerted *to a definite extent, and maintained without variation at the same point for some time*. The dilatation of the little arteries is effected, and the degree of constriction exerted by the muscular coat is altered for a time. The muscular fibres yield according to the degree of paralyzing action produced upon the afferent nerves at the seat of injury. That the degree of dilatation does not vary from moment to moment may be proved in a very simple manner. If you squeeze the little vessels of the congested area of skin by pressing firmly for a second or two with one finger, so as to drive the blood out of the vessels, the whole of the skin subjected to the pressure will be seen to be uniformly pale. In a few seconds after the pressure has been removed, the blood will re-enter the vessels, and the inflamed area will resume its redness, while the surrounding skin regains its original tint. The varying degrees of redness observed in different fleabites are due entirely to the varying degree of dilatation of the hundreds of little arteries which supply the capillary vessels of the inflamed area. The distension of the capillaries varies according to the calibre of the arteries, and is therefore entirely under nerve control. If complete paralysis of the nerve-fibres distributed to the little arteries, or of the centres from which they emanate, were to occur, the capillaries would become distended to the utmost limit, and the circulation through them would cease. The surrounding

tissues deprived of their blood supply would become disorganized and might at once pass into a gangrenous state, or might slowly degenerate and waste. Such is the nature of the very important vascular phenomena which occur in all cases of inflammation, and which, when affecting a considerable extent of tissue may cause serious structural changes, and result in the development of chronic disease, or, where certain important organs are affected, may cause even sudden death.

General Vascular Disturbance resulting from Local Injury.—But in many instances, the result of the local injury is much more widely extended. In some cases this is due to poison being introduced into the blood, so that the whole mass of nutrient fluid is poisoned, and, through it, every tissue and organ of the body may suffer. But there are not a few instances in which the facts cannot be thus explained, but seem rather to be due to the same series of changes which occur in an ordinary fleabite, only the action is more intense. The bite of a gnat, the sting of a bee, wasp, or hornet, will occasion phenomena in connection with the vessels of the same kind, but far more serious and extensive than the injury produced by the lancet of the flea. Such local injuries may cause dilatation of the little arteries and capillaries over a considerable portion of the body. In consequence of the bite of an ordinary gnat, the whole of one arm may become enormously swollen. So large a quantity of exudation may escape from the vessels, that the areolar tissue of the limb may be much distended, the elements of the tissues generally being in a state of tension, their action much deranged or entirely marred. In short, a condition of very acute and serious inflammation may result.

In such a case I think that the more extensive local mischief is perhaps due to a more severe and more extensive

local change having been produced at the seat of injury. Instead of derangement of the action of the vessels of a very limited area of skin, as in the fleabite, we have evidence of extensive disturbance in the circulation affecting small arteries, capillaries, and veins of the tissues, of a part of a limb, or of the entire limb. The influence is, however, still limited, and such a case must be distinguished from those in which the tissue changes result from the whole mass of the blood being poisoned. As a general rule, a gnat-bite does no harm whatever. Most of us have been bitten over and over again; and I dare say some have carefully watched the interesting operation performed by the insect, and when the instrument had been skilfully inserted through the cuticle, and into the true skin, have felt the pricking sensation which indicates the arrival of its point at the nerve-fibres adjacent to the capillary. Then follows the perforation of the capillary, and soon the blood ascends, and you see the abdominal cavity of the insect undergoing gradual distension from the inflowing blood. In a short time the creature is satisfied, and, after carefully withdrawing his proboscis, he contentedly flies away, though slowly, for his body is more than twice as heavy as when he first attacked you.*

* An interesting fact has been made out by Dr. Mason in China, with regard to the transference by gnats of embryonic or immature entozoa from the blood of the human organism to water. The minute *Filaria sanguinus hominis* is the entozoon in question. It exists in the blood in certain cases in immense numbers, and has been removed from the circulating medium, and transferred to the situation where it is to undergo further change in the remarkable way just referred to. An excellent *résumé* of what is known concerning this entozoon will be found in a paper read at the Epidemiological Society, by Sir Joseph Fayrer, and published in the Lancet for February 8th, 1879.

We have long known that many infectious diseases may be spread by the agency of insects, but here we have an insect extracting blood from the interior of the vessels, and carrying some of this very same blood,

With the exception of slight tingling, which lasts for a little while, no further effect, as a general rule, is produced; but I know persons who do not escape so easily. Sometimes a single gnat-bite will cause the whole of the hand and arm to swell enormously, and the state of inflammation may last for two or three days, and may be accompanied by much pain. A similar remark applies to the sting of a bee, or wasp, or hornet. Some are seriously affected, while others escape with very little inconvenience.

Such facts are not incompatible with the view of the phenomena being essentially due to nerve change, and we have ample evidence that some persons' nerves are much more susceptible to the same degre of irritation, mechanical or chemical, than are those of others. A mechanical injury or a poisonous influence sufficiently severe to cause death in one case might scarcely produce any serious change in another. It is possible that there may be some structural difference in the nervous system of the two persons, but it is more probable that the cause of difference in the results is deeper, and depends upon some difference in the individuality and powers of the bioplasm of the nerve of a nature not to be rendered evident by physical investigation. We note corresponding peculiarities as regards the action of medicine. I have known instances in which the smallest dose of morphia will occasion, within three or four hours of its being swallowed, dilatation of the capillary vessels of the greater part of the body, shown by a diffused redness in patches

and diffusing any special living particles it contains into other media, where they may pass another part of their existence, and possibly grow and multiply. It is obvious that other living poisonous matters may be spread far and wide in the same manner, and thus many special fevers, and inflammatory diseases occurring in man and animals, and depending upon a living poison, may be carried to a distance, and preserved for long periods of time, or undergo further development.

over a great part of the surface of the body. Less than one-tenth of a grain of morphia has led to this result, but such a dose, as a general rule, would produce only a very slight effect, or the person might be unconscious that any such drug had been given at all. The nerves and nerve-centres connected with the vascular system exhibit very different degrees of sensitiveness or susceptibility in different persons.

In discussing the probable nature of the actual changes induced by such poisons, which act upon the fine ramifications of the nerves distributed to capillary vessels, we have to consider: 1, the direct local action of the poisonous material on the nerve-fibres and other tissues with which it comes at once into contact; and, 2, the local action of the poison on the capillary nerves in many tissues and organs of the body at a distance from the seat of injury, through the contamination of the whole mass of the blood.

In both cases, whether the action be local or general, circumscribed or diffused, the widest difference as regards degree of action exerted by the same poison and the same amount of poison will be observed, and this must be referred to the peculiarity of constitution of the individual, the degree of tolerance his nerves may have acquired by the influence of previous exposure, and a number of other circumstances. The same amount of poison in the blood may be sufficient to cause the most grave symptoms in one person and not give rise to the slightest change in others.

You see how large a subject is opened for consideration by the demonstration of the nerve-fibres to capillary vessels, and what a number of important and widely separated physiological and pathological actions may be explained and accounted for by their influence.

Of the Formation of Pus in and near the Capillaries in Inflammation and Fever.—I have already advanced arguments which justify the conclusion that fever

may be correctly regarded as a *General Inflammation,* while inflammation may be considered to be a *Local Fever.* Some among you who have considered the matter may, however, object to the statement on the ground that what is known as "pus" is a very constant product in inflammations, but is not formed in fevers generally. Such an objection, however, disappears if we study the mode of formation of pus. Indeed, in most fevers, happily, the pathological phenomena are not sufficiently intense,—do not go far enough to result in the development of pus-corpuscles.

There are, however, fevers in which the development of pus is common enough. In Erysipelas, which may be correctly included under fevers or inflammations, pus, as you are aware, is often formed to an extent sufficient to destroy important tissues and to cause death. Some of you may have heard of late years that erysipelas, like many other fevers and inflammations, is to be attributed to bacteria. The process of suppuration itself, it has been said, is due to these organisms. Instead of entering upon the consideration of this question, which I have already treated of in "Disease Germs," and elsewhere, I shall only say, that in my opinion, there is no reasonable ground for either hypothesis, and that the facts can be adequately explained without invoking the aid of bacteria. In connection with the changes taking place in erysipelas, pus unfortunately is commonly formed. You may have the tissues in the greater part of the affected limb suppurating. The areolar tissue, extending over a considerable part of the body, may be the seat of the formation and multiplication of pus-corpuscles.

In ordinary fevers life is destroyed before the degree of change involved in the occurrence of suppuration has been reached. If, however, the fever lasted for a considerable period of time, and if life were sustained for time sufficient, some of the tissues might pass into the state of suppuration.

Such a change is unfortunately only too frequent in severe cases of scarlet fever, when suppuration in several of the joints sometimes occurs, and small abscesses are not unfrequently developed in many different parts of the body. It is therefore easy to see why suppuration should be more commonly developed in connection with the intense local inflammation than in the case of the more widely spread, but less intense action occurring in the fever. In inflammation the change is comparatively circumscribed, and may therefore go to a much greater extent without destroying life than is possible in the case of fevers, in which the mass of the blood and every tissue in the body is more or less affected. A huge abscess, containing pints of pus, may be formed in the course of a fever, and the patient nevertheless get perfectly well, if only his strength be supported and the case be judiciously managed. Anything like general suppuration of all the tissues of the body,—in fact, of uniform suppuration, is impossible in fever, because death would take place long before such an event could occur.

The formation of pus, and the manner in which the pus-corpuscles move and grow and multiply, have been already referred to on p. 280.

Of the Passage of Blood and Living Particles through the Walls of Capillary Vessels—Diapedesis.—I have now to say a few words about certain other phenomena. When ordinary inflammation takes place in a part, the vessels, as I have already said, are more or less distended with blood, and as the walls of these capillary vessels are stretched and rendered thinner by distension, fluid will more readily transude through them than when they are in their usual medium state of tension. Suppose this outline (chalk diagram) to represent the area of a section of a capillary vessel in the ordinary state, neither contracted nor stretched. This larger circle with thinner out-

line (diagram) may stand for the same capillary vessel, with its walls much thinner and its calibre greatly increased, as in the congestion, which gradually passes into the state of inflammation. Now, it is obvious that, if the walls of this capillary are to be so stretched as to form a tube as much more capacious than the vessel in the ordinary state, as is this circle, than that indicated by the last outline, great thinning of the walls must take place. Whenever capillary vessels are distended with blood, there must be increased tenuity of their walls. The greater the diameter of the vessel the thinner will be its walls; and the thinner the walls the more readily will fluid permeate them. Now, in Inflammation and Fever, fluid, and often not only fluid, transudes from the blood through the walls of the capillaries of the affected part into the tissues around the bloodvessels.

The material which is poured out, which is called *Exudation*, varies somewhat in character and composition in different cases. Certain changes taking place in the blood itself may cause the fluid to become more permeable than the ordinary fluid portion (*liquor sanguinis*) of healthy blood. In many forms of disease the quantity of matter dissolved in the fluid which permeates the vascular walls is greatly increased. But, besides the fluid which transudes through the capillary vessels in inflammation and fever, multitudes of excessively minute, soft particles actually traverse the capillary wall. Of these, the great majority are less than the one hundred-thousandth of an inch in diameter, but some are very much larger than this. Indeed, particles as large as a red blood-corpuscle may find their way through the capillary wall without causing any rupture or permanent damage to the vessel, and through openings which it is not easy to demonstrate. After this has occurred, the stretched and distended vessels may return to their ordinary condi-

tion without any deterioration of the structure occurring in the walls which have been stretched.

You will naturally inquire how large particles like the red blood-corpuscles can pass through the walls of vessels in which no fissures or openings can be discerned. When we study the changes taking place during development, we learn that the capillary vessels are, as it were, laid down in such manner that the tissue of which they are composed, though exhibiting no definite indication of actual fibres, tears much more readily in the longitudinal than in the transverse direction. Whenever the capillaries are distended by the accumulation of blood, and their walls stretched by lateral pressure, the fibre network, of which they may be supposed to consist, would have its meshes considerably widened in such a way that longitudinal rents or fissures would result, which would be large enough to permit the passage of more than one red blood-corpuscle at a time through them. The distending force ceasing, the elastic tissue of the capillary wall reacts, and the vessel gradually returns to its ordinary size, the rents slowly closing up. We can, therefore, readily imagine that a body as large as a blood-corpuscle would easily pass sideways through one of these fissures and pass amongst the tissues outside the vessels. Such escape of blood-corpuscles, a few at a time, takes place from the capillaries of the walls of the air-cells of the lungs in every case of ordinary inflammation of the lung tissue, or *Pneumonia*. In cases, however, in which blood extravasates to any great extent, as where blood escapes from a surface in drops, a free tearing, or other solution of continuity, of the walls of the vessels undoubtedly occurs. Even where violent hæmorrhage has taken place from vessels of considerable dimensions, it is often most difficult to demonstrate the opening. You need not, therefore, be surprised to learn that it is almost impossible to expose the

actual holes, rents, or fissures in the walls of *capillary vessels* which have allowed the exit of a few blood-corpuscles. There are cases in which hæmorrhage occurs from a vast tract of capillary vessels, as, for example, of the mucous membrane of the small intestine, and yet the fissures or rents cannot be detected, though several pints of blood may have been lost in the course of half an hour, in consequence of *capillary hæmorrhage*, resulting in faintness and death. In such cases of fatal capillary hæmorrhage, no doubt, degenerative changes have been taking place in the walls of the capillary vessels involved during a considerable period of time previous to the occurrence of the hæmorrhage. When one comes to examine the mucous membrane after death, the whole of the surface is found suffused, and the tissues, so to say, infiltrated with blood which has issued from millions and millions of capillaries, distributed over perhaps as much as six feet of intestine. I have seen several instances of death from almost sudden and profuse capillary hæmorrhage from the intestine consequent upon slow morbid changes proceeding in the liver, and resulting in the condition known as *cirrhosis*. In the course of this disease the circulation through the liver becomes greatly impeded, and, in consequence, congestion of the mucous membrane of the intestines ensues, and frequent slight attacks of bleeding occur, which may at last end in extensive and fatal hæmorrhage.

If you were to inject the vessels in such a case, the injection would ooze from multitudes of minute openings, but no large aperture would be discovered in any large or small vein or artery. The case is very different where a large vessel is opened in the process of ulceration, as frequently occurs in the course of ulcer of the stomach, and in phthisis, or as sometimes happens in aneurism.

There are certain forms of capillary bleeding or hæmor-

rhage which are very common, and are not indicative of any actual disease, and which may fairly be regarded as slight ailments. Bleeding from the mucous membrane of the nose is an example. Some children frequently suffer from this affection, and in certain instances relief is afforded by the slight loss of blood which occurs. Occasionally, bleeding takes place from *the rectum*, without producing more than temporary derangement, though of course it causes alarm to the patient and his friends. Hæmorrhage of the same kind may take place from the back of the throat, from the gums, from the stomach, and even from the lungs, You must be very careful about giving a too positive opinion concerning the exact nature of many of these cases, for in some the bleeding will be due to, and perhaps afford the first indication of grave disease. On the other hand, even several teaspoonfuls of blood may, in this way, escape from capillary vessels, and yet the general health may not be deranged. After tension has been relieved by this hæmorrhage the vessels return to their former state, and the blood circulates in them as before.

In cases of hæmorrhage from the mucous membrane of the nose, I believe that the vessels become much congested, and that actual longitudinal rents or fissures result, through which blood escapes. If the attacks are frequent and severe, and the patient's strength fails, it may be necessary to interfere. Perfect rest in the half recumbent posture, the application of cold to the nose externally, sucking small pieces of ice, are usually effectual, but it may be necessary to use styptics or "plug the nostrils" in severe cases. This, however, is not the place to discuss the treatment requisite in cases of such gravity. Nevertheless, I should mention that bleeding not depending upon actual disease does take place from many other parts as well as from the mucous membrane of the nose.

Various kinds of hæmorrhage from minute vessels used to be spoken of as hæmorrhage by exhalation; and the older observers believed that the escape of blood from the vessels occurred in some mysterious manner not to be adequately explained. They seemed to think that the blood passed through the walls of vessels in some strange and inscrutable manner. By the aid of recent investigations we can form a clear idea of the manner in which the hæmorrhage through the walls of the capillaries may occur without actual rupture. The phenomenon is of great interest, and we may conveniently consider under the same head a process, which has been regarded by many observers as essential to more than one general pathological change, and which has been spoken of as *Diapedesis*.

Cohnheim, of Berlin, proved experimentally that colorless blood-corpuscles might pass from the cavity of the peritoneum into the vascular system, and that in the case of the membrane of the frog's foot and other tissues when in a state of inflammation, colorless blood-corpuscles made their way through the capillary walls, though no openings could be seen, and the capillaries themselves were not unduly distended. Cohnheim maintained that this migration of colorless blood-corpuscles was an ordinary phenomenon; that it was common, and constantly took place to a great extent in every case of inflammation. Nay, more than this, Cohnheim went so far as to insist that pus itself consisted of colorless blood-corpuscles, which had made their way out of the vessels. Of course, it occurred to many that the last proposition was rather difficult to accept, for the number of pus-corpuscles in an ordinary abscess, formed in the course of the twenty-four hours, is so great, that were every colorless blood-corpuscle in the abscess a mere modicum of the total quantity of pus would be thus accounted for. The pus-corpuscles would outnum-

ber by many times the whole of the colorless blood-corpuscles in the body. Many observers in this country advocated the view, and it now forms a cardinal doctrine of more than one school of pathology. Of those who have seen the phenomenon in question, some will tell you that it is easily demonstrated and occurs constantly, but he who proceeds to study the matter for himself will find that only very occasionally can he actually catch a colorless blood-corpuscle passing through the vascular walls. The careful observer will not infrequently find that a corpuscle which seems to pass through the walls of a vessel does not really do so, and is, in fact, either in front of the capillary or behind it, and has not come out of the vessel at all.

There is, however, not the least doubt that this migration of colorless blood-corpuscles occurs, but I believe it to be an exceptional rather than a common phenomenon, while I feel sure that in many cases, the process of inflammation may run its course entirely, without the escape of a single blood-corpuscle.

Now, the corpuscles found outside the capillaries in great numbers in cases of inflammation, are produced by the growth of very minute particles, and do not consist of colorless blood-corpuscles, which, as such, have traversed the walls in the manner described. The corpuscles, like colorless blood-corpuscles found in immense numbers outside the capillaries in many cases of inflammation, could not have resulted in the manner supposed. So far from having been colorless blood-corpuscles, it is doubtful whether at any time one of them ever circulated in the blood as such. What, then, are these bodies, and how do they attain the position in which we find them?

Some years before Cohnheim published his views, I had described another process of migration, or rather pouring out from the blood, suspended in *liquor sanguinis*, of minute

particles of living matter or bioplasm, which no doubt play a very important part in the complex phenomenon of inflammation. I showed that, if a very thin layer of healthy blood was examined by a high magnifying power, a number of corpuscles, infinitely smaller than either red or colorless corpuscles were to be detected, and not only so, but I proved that these minute corpuscles, varying from the one ten-thousandth to the one hundred-thousandth of an inch in diameter, and probably corpuscles still more minute, consisted of bioplasm, or living matter. Further, I stated that the blood of man and the higher animals, while circulating in the living body, ought to be regarded as a fluid holding in suspension countless multitudes of minute particles of living matter which, at death, underwent a great change, and became converted into several different substances, among the most important of which is the substance we call fibrin. Similar minute particles of living matter are held in suspension in the circulating and nutrient fluids of every living organism, and are found even in the nutrient fluids of plants. In the large cells of Vallisneria spiralis, which you may easily grow in a glass jar in your sitting-room, you may see the rotation of the so-called "cell contents." The most important of these contents being the perfectly clear fluid which passes round and round the cell, as long as the very minute particles of bioplasm suspended in it continue alive. No one has succeeded in accounting for these movements by physical and chemical changes, though many have attempted to do so, and many more have affirmed that it can be so explained, and that, even if the explanation is not quite adequate and satisfactory, it will be found to be so at some future time. The power of moving resides in the particles themselves. As long as the matter lives it may move, but when it dies the moving power is completely lost. This remarkable spontaneous movement, which we may see

in the pus-corpuscle, in the colorless blood-corpuscle, and in other forms of bioplasm belonging to man, to animals, and to plants, has been attributed to certain reactions between the particles and their environment, but if you will only study, and ponder over what you observe, you will soon be convinced of the incorrectness of the views in question. At no period of history have such ridiculous statements been made concerning the nature and actions of living beings as in our own time. So far from being in advance, the ancients would have laughed at much that now passes for philosophy. Many of those who make the assertions know them to be untenable, but repeat them over and over again. It must be admitted that the most nonsensical views concerning many things have been received as true after they had been repeatedly urged in very strong language. When people hear a thing many times they think there must be "something in it." So they believe it, or try it, or take it, as the case may be. The confidence with which physical explanations of purely vital phenomena are asserted is most extraordinary. On one side there is astounding audacity and arrogance, on the other silly acquiescence, and an almost incredible credulity. Some teachers do not hesitate to tell the public that they *know* many things which have not been proved, because they are peculiarly strong, and are privileged to prophesy. Such persons affirm that they discern all sorts of wonderful things, but they cannot tell you how to discern, or by what means they have been able to discern. They are "gifted spirits," and do not belong to the class of ordinary mortals. Some of these prophetic philosophers have excelled in physical and chemical inquiries,—but without having earnestly studied the phenomena of any living being, nay, without being even practically skilled in the methods of investigation, dare to wildly assault the whole world of life, and declare that all liv-

ing things are produced and built up and worked according to the very same principles and laws which alone control the non-living world and bind it in eternal helplessness.

Any one who quietly studies nature and is able to think aright must come to a very different conclusion. Let me persuade you to observe what happens as the simplest of living things grows. Take, for instance, ordinary mildew, which can be obtained easily enough, or which each can grow for himself, for its germs are always present in the air. You may grow it in a little acid urine if you like. By carefully watching it, you will be convinced that it grows by taking up nutrient matter, which is not deposited upon its surface but taken into its very substance, where it becomes converted into living matter, from every particle of which new particles may result. Ask the physicist to explain, if he can do so by any physical laws, the phenomena which have occurred while the organism has been under your observation. Up to this time instead of telling us what is going on—instead of describing by what means matter is changed in composition and acquires new properties whenever it is caused to assume the living state, confident physicists assert, and not infrequently with an air of superiority which is amusing, what according to their powers of prevision is certainly to be achieved by physicists in the far-off future. Perhaps the materialist gifted with prophetic powers enlarges on the subject of chemical affinity and its possibilities in the future, perhaps he will tell you about attractions and properties, tendencies, molecular forces, potentialities, and evolutions and laws, and discoveries concerning things that may be, or are to be, and which he alone is able to discern in his imagination,—but he will *not* tell you what happens whenever lifeless matter lives, or when living matter dies. No adequate explanation as regards the nature of the change from non-living to living, and from living to dead,

has been discovered in the past, nothing definite is known to the physicist at the present time, but what is not discovered by him now is to be rendered evident by his successors in the future,—that future which is now very far off, and which as time goes on becomes dimmer and more remote. The phenomena which you observe in the case of the mildew or any other simple organism, closely resemble those which are observed in the case of living particles belonging to man and the higher animals, both in health and disease, and can be accounted for only if we attribute them to the influence of a peculiar power or agency associated with the matter while it is alive, and which is absolutely distinct from any of the known properties or forces of ordinary matter.

The minute particles of bioplasm or living matter which pass through the walls of the capillary vessels in cases of ordinary inflammation soon begin to undergo alteration. As long as they were being rapidly moved about in the blood-current these particles would undergo little or no active change ; but as soon as they become still and quiescent they begin by their own inherent power of movement to make their way through the walls of the vessels (p. 308), and soon take up and appropriate the nutrient materials which surrounds them. While in the blood, probably in those organs where the circulation of the blood goes on very slowly, these minute particles grow and slowly undergo conversion into the bodies known as the colorless blood-corpuscles. When outside the vessels, as in inflammation, the minute particles grow more quickly and soon assume the form of the colorless corpuscles which we see in such immense numbers in the interstices of various tissues and just outside the walls of the vessels in inflammation. In this way are formed the so-called inflammatory corpuscles.

Under certain circumstances the bioplasts in question : 1, soon die, and the products resulting from their death are

quickly reabsorbed ; 2, under other conditions they develop a delicate fibrous material, while ; 3, if supplied with plenty of pabulum they may continue to grow and multiply very rapidly until the product called pus results. Pus-corpuscles are particles of living matter or bioplasm, which have been developed by descent from the minute living particles under consideration, or more directly from colorless blood-corpuscles, or from the bioplasm of some tissue. From such particles of bioplasm every form of adventitious fibrous tissue is produced which we find outside the walls of the capillaries and in the interstices of the tissues in various forms both of acute and chronic inflammation. The delicate fibrous tissue at first formed loses water, contracts, and gradually becomes condensed. The "thickening" and condensation which you often meet with in tissues which have been inflamed is thus brought about.

As I have already remarked, the minute particles of living matter, or bioplasm, outside the walls of the capillaries may also grow and multiply until multitudes of "pus-corpuscles" result. Even at this time the fact that pus-corpuscles grow and multiply of themselves by the formation of little offsets, outgrowths, or diverticula, which are from time to time detached, is not generally recognized. You may remember, in a former lecture, I described how the bioplasm of a cell might increase in size, and might give off diverticula, which being detached, form separate portions of bioplasm, each of which may grow and give off more processes, until by the growth and multiplication of a few particles millions of the masses of bioplasm known as pus-corpuscles are formed, every one of which may be regarded as a descendant of the bioplasm or nucleus of an epithelial cell. The pus-corpuscle cannot, therefore, be looked upon as an individual colorless blood-corpuscle, which has simply migrated from the blood by traversing the walls of the vessel.

SOME COMMON FORMS OF SLIGHT INFLAMMATION.

I pass on to consider the essential changes which occur in epithelium and in certain tissue elements in some of the ordinary slight inflammations which are commonly met with. These changes do not necessarily lead to any structural alterations, but if the inflammatory process continues for a certain period of time, it may be followed by tissue degeneration and other pathological phenomena, from which complete recovery is no longer possible. Not a few of the inflammations are superficial, and although most of them are by no means serious, some are very troublesome and perhaps excessively painful. It is desirable, therefore, not only that you should well know how to detect and distinguish them, but you ought to be fully conversant with the exact nature of the minute changes taking place.

The treatment of some of the inflammations in question has been already considered, but it seems to me very important that I should do my best to direct your attention to the influence exerted by simple remedies upon the intimate phenomena which are proceeding, and which have been rendered evident to us by careful microscopical research. He will be most successful in the management of disease who succeeds in picturing to himself the wonderful changes which proceed in such marvellous minuteness and detail, and are revealed to those who have long and earnestly studied, and have taken full advantage of, the elaborate means of minute investigation now at their disposal.

The mucous membrane of the nose and its many passages, as has been already stated (page 252), is very liable to slight inflammation. In the changes which occur during an ordinary cold we have an illustration of the very gradual passage of physiological into pathological actions. There is a particular point in these changes when it would be impossi-

ble to decide whether it would be more correct to say that the membrane still remained in a healthy state or had just passed from this into a morbid condition. The difference between certain normal and inflammatory states unquestionably depends only upon an exaggeration of the activity with which normal changes are performed.

Formation of Mucus.—Mucus, as you know, is formed in small quantity in the follicles and glands in connection with the mucous membrane of the nose, even in perfect health. When we suffer from a common "cold in the head," these particles of bioplasm which take part in the formation of the tenacious mucus around them, grow and multiply more quickly than they do in the perfectly healthy state. The material formed by them is in greater proportion, softer in consistence, more decomposed and broken down, and in it bacteria and low forms of life find materials favorable for their development, and eminently suitable for their nutrition.

Mucus-corpuscle.—I have many times spoken of the bioplasm which constitutes the so-called mucus-corpuscle, but I have not told you how you should proceed to observe the wonderful vital movements which occur during its life, and especially at the commencement of a slight cold, when the activity of the movement is considerably increased. Having obtained, by coughing or sneezing, a small piece of the transparent mucus, about the size of a pin's head, you place it on an ordinary microscope plate-glass slide. Next, cover it with a piece of the thinnest covering glass you can obtain, without adding water or any other substance. Gently press down the thin glass cover with the aid of a pin or needle, and place the slide under the microscope, using first of all a quarter of an inch object-glass, and a twelfth or higher power, if you are fortunate enough to possess one. If not, you can gain the requisite degree of amplifying power in

another way, and at the cost of a shilling or two. A piece of brass tubing, of the same diameter as that of the tube of the microscope, and arranged to carry the eye-piece, is fitted to it, sliding in just as the eye-piece does. The total length of the tube, to one end of which the object-glass, and to the other the eye-piece, is attached, is in this way increased to about eighteen inches. The intensity of the illumination must be somewhat increased, and you will find the little particles of mucus will be so highly magnified that you will be able to study the slightest changes which take place in their form from moment to moment. You will see in the thin layer of transparent mucus a vast number of the minute oval particles which consist of living matter or bioplasm. These may be said to represent, and indeed correspond to, the "nucleus" of an ordinary epithelial cell, while the mucus—that viscid material which surrounds them—corresponds to the wall of the cell. If the epithelium of other mucous membranes grows unusually fast, you may get a material which corresponds to, and indeed resembles, mucus. If you select one of the oval corpuscles, and examine it intently, you will soon observe changes in its outline. Here and there protrusions will occur, portions of the mass moving away, but without being detached, and then withdrawn. In fact, the movements very closely resemble those seen in an ordinary *amœba*, and are *vital movements* of the same nature. They continue for a considerable period of time—perhaps for twelve hours, or longer, if you can keep the mucus from drying up. Such changes occur in bioplasm generally, but it is only here and there that we are able to demonstrate them so satisfactorily as in the case of the living mucus-corpuscle, pus-corpuscle, and colorless blood-corpuscle. In these any one can study, and at any time he desires to do so, the vital movements of bioplasm or living matter.

In an inflamed mucous membrane, besides those prominent derangements, increased redness caused by congestion of the capillaries, and increased dryness consequent upon the defective pouring out of the fluid from the blood to take the place of that which has been quickly removed from the surface by evaporation,—we have to notice important changes in connection with the action of the nerves. Every one who has had a cold knows that the sensation of the part is affected, the mucous membrane is sore and painful, so that his attention is being frequently directed to it. He fancies something is adhering to it which requires to be removed, and is constantly making efforts to effect this object. In some cases a certain quantity of mucus collects upon the surface and dries, in others the sensation experienced seems rather to be due to the tissues being infiltrated with fluid. Sometimes the mucous membrane, particularly at the margin of the nose, becomes excoriated, or a superficial ulcer may form. In the last case it will be found that the ordinary protective hardened epithelial covering has been here and there removed, and a raw and highly sensitive fissure formed, at the bottom of which are capillaries and nerve-fibres. From the capillaries fluid escapes holding in suspension numerous minute particles of bioplasm, and not unfrequently small quantities of blood itself are poured out. The pain experienced is due to the exposure or incomplete exposure of delicate nerve-fibres. The particular nerves affected are those which are distributed close to the capillary vessels, and which have been described in p. 290. Other nerve-fibres may be involved, and as I have already mentioned, there are tissues in which nerve-fibres are distributed, although no capillaries exist, and these nerve-fibres are concerned in the pain experienced when the tissue is inflamed. At the same time it is probable that the nerves in question belong to the same system as those distributed

to capillaries, while there is no doubt that the latter are concerned in transmitting to us the impressions which we call pain. I have already remarked that as regards many tissues to which numbers of nerve-fibres are distributed, we are quite unconscious of their existence so long as the normal or healthy state lasts, but as soon as this gives place to inflammation, pain, it may be of the most exquisite kind, results, the nerves concerned being those of the capillary vessels which belong to that self-regulating system of nerves before referred to (p. 292). These fine nerve-fibres become, as I have said, stretched or pressed upon by the distended capillary vessels, and perhaps otherwise affected by the exudation which takes place, and in consequence of these derangements, this departure from the normal state, as respects the nerve-fibre, and the bioplasm which is connected with it, that disturbance of the nerve-current which we term pain results.

But besides the alteration in the sensibility of the mucous membrane, important changes are observed in connection with the phenomena of reflex muscular action. You are all aware that upon tickling the fauces ever so slightly, convulsive movements of swallowing will be produced if the mucous membrane be in a healthy state. In slight "sore throat" you will find that the response to slight irritation will be slow and imperfect, while in some forms of inflammation no efforts of deglutition will be excited even by very decided irritation. These changes are due to an alteration in the sensitiveness of the mucous membrane consequent upon pressure or stretching of the delicate nerve-fibres, whereby they cease to conduct impressions from the periphery to the nerve-centres.

The dry state induced by slight inflammation of the mucous membrane may last for a short time, and then gradually subside without any further pathological action. If,

however, the dryness and diminished secretion should persist for some weeks, restoration to the ordinary condition takes place very slowly, and before the healthy state can be resumed, an opposite state of things comes on. Secretion is poured out; it may be in very considerable quantity. This tendency to secretion, being once established, may exist for days or weeks, and then it begins to diminish in amount, and by degrees the glands return to their normal state of very slight activity, secreting only a very small amount of transparent viscid mucus.

Counter-action, Counter-irritation.—But we may reduce the secretion consequent upon exaggerated action by proceeding in another way. Instead of trying to act directly upon the membrane which is the seat of the increased action, we may endeavor to establish increased action of surfaces or organs at a distance, and situated, it may be, in different parts of the body, and in this way we may diminish the inflammation and undue action which are going on in the surface of the nose. I will now direct your attention to a very important principle connected with the treatment of disease, a principle which has been carried out for years, or even centuries, and concerning the mode of action of which we are much better informed than our predecessors were. You may reduce the rate or degree of action in one part of the body by increasing it in another, as may be proved by a simple experiment. When a cold is coming on, you feel great discomfort about the nose, the mucous membrane being so swollen, that the nasal passages are obstructed, so that if you try to force air down one nostril, you fail, or can only cause a little air to pass through if you make a great effort. You are obliged to breathe entirely through the mouth under these circumstances. The discomfort caused by the swollen state of the mucous membrane, depending partly upon exudation into the submucous tissue,

and partly due to increased nutrition going on in the epithelial covering, may be ameliorated in a very short period of time, and in a very simple manner. Now let the feet be put into water, as hot as you can bear it without severe pain. In the course of a quarter of an hour, the disagreeable feeling of fulness and obstruction in the nose will disappear. The air will pass through the passages of the nose quite freely. By increasing the flow of blood in the lower extremities, much of the circulating fluid will be diverted, for the time being, from the mucous membrane of the nose.

Many cases of headache are also relieved by putting the feet into hot water. If, instead of putting the feet into hot water, a mustard poultice be applied to the back of the neck, a similar effect would follow. As soon as the mustard poultice begins to act, the vessels, or more correctly, the nerve-fibres distributed to the capillaries ramifying just beneath the epithelium, irritated and then poisoned by the oil of the mustard, bring about changes which result in the vessels becoming red and turgid from the increased quantity of blood passing into them; the blood circulates more slowly, and gradually accumulates, and the surface becomes red and exceedingly painful. Corresponding with this increased action in the healthy part we have reduced action at the seat of the morbid change.

In this way we are able to effect alterations which are of immense importance in the treatment of many different forms of disease. In cases where the morbid action is chronic, we keep up the counter-irritation to a moderate extent, or we repeat the application of the counter-irritant from time to time. Even in very chronic diseases, there is good reasons for adopting this principle of treatment. In some cases of phthisis, where there was reason to think that tubercle was limited to a very small extent of pulmonary tissue, benefit seems to have resulted from keeping a small

open sore on the skin of the upper part of the chest on the same side of the body as the disease. This is a form of "issue." In these days, however, this system of treatment is now rarely, perhaps too seldom, employed.

Besides the mucous membrane of the nose, it is not uncommon to find a slight pathological derangement taking place in connection with the skin and mucous membrane of the lips. That surface becomes more or less dry, and the epithelium of the red part of the lip which resembles that covering the skin, as well as the soft, moist epithelium lining the cavity of the mouth (the surface of the lips partaking of the characters of skin and mucous membrane), becomes deranged in its growth. The surface, instead of remaining perfectly smooth, becomes more or less rough. Attempts are being continually made to make the surface even, by rubbing it so as to remove the little projecting pieces of cuticle. In this way the derangement is kept up or intensified. The cuticle tends to peel off in thin laminæ, and many people cannot resist the temptation to catch at the pieces, and tear them away. But where they do so, matters are made worse. The surface becomes raw, and often bleeds. In consequence of the air coming in contact with it, the moisture soon disappears, and the surface soon gets dry, and is more or less corrugated, and painful.

By the irregular growth of epithelium the arrangement of the finest nerve-fibres is disturbed, and constant irritation gives rise to irregular stretching or pressure. The sensations thus caused, and rapidly succeeding one another, excite the constant attention of the patient, and he continually rubs the affected part, or keeps constantly picking at any loose portion of cuticle. Immediately around the irritated nerve-fibres are multitudes of particles of living bioplasm growing and multiplying, forming a mass of soft, spongy matter, the constituent particles of which are always

changing in position, while the drying that is proceeding on the surface must necessarily disturb the nerve-fibres, as well as other structures beneath. Schoolboys are very prone to pick their lips when in this state, and make them extremely sore, and particularly at the line where the thin skin of the lip joins the ordinary skin, and at the angles of the mouth, where little fissures often form, which may remain for days or weeks, sometimes giving rise to ugly and troublesome sores. It is very desirable to prevent the irritation which so disturbs the patient and causes him to make the sore worse, and retard the healing.

Treatment.—Now, upon what principles should the treatment of such simple excoriations and slight superficial ulcerations be based? Our main object should be to reduce the growth and multiplication of the particles of bioplasm which are instrumental in keeping the fissure open. This cannot be effected by causing them to dry up, because a little crust soon forms which, in consequence of the contraction produced by desiccation, is drawn away from the subjacent parts. In this way a raw surface is again exposed, and is increased perhaps in its extent. We must try at the same time to prevent this drying, and to reduce the tendency to growth of bioplasm and pouring out from the blood of fresh plasma containing more bioplasm particles. By effecting these objects, many lotions and other local applications encourage healing. Some of them lead to the formation of a dry scab, so thin that it does not become detached, while others are employed for the purpose of reducing the rate of growth of the masses of bioplasm on the surface of the sore, which is at the same time kept moist, while the formation of the more permanent tissues slowly proceeds beneath.

Alcohol.—One of the most potent applications for healing such slight sores as have been referred to, is alcohol.

The sore place may be painted over once in an hour or so, with pretty strong spirit, a camel-hair brush being used for the purpose. Of course, there is a sharp pain as soon as the alcohol comes into contact with the delicate nerve-fibres, but it soon passes off. In many cases it is well to dilute with an equal quantity of water or rose water. It matters little whether you use any of the ordinary spirits, or spirits of wine, diluted with one-third part of pure water, or Eau de Cologne. After a few applications, the thin skin on the surface of the fissure or ulcer becomes hardened, and the soft, new epithelium that is being formed will become condensed, and the cuticle soon resume its normal state. Let us consider how alcohol acts advantageously under these circumstrnces: by its property of coagulating albuminous matters, alcohol tends to retard rapid growth, and interferes with the multiplication of those particles of bioplasm which are growing so rapidly just outside the capillaries. The bioplasm, as I have mentioned, is growing so very fast, that there is not time for the development and consolidation of that firm, healthy-formed material which, with living matter, constitutes a cuticle cell. By applying alcohol then, you favor the formation of cuticular cells. Wherever the cuticle is thin, by painting it frequently with alcohol, you favor its formation and assist its condensation and its increase in thickness.

If there should be sores in the mouth, or the mucous membrane of the gum should be soft and spongy from the infiltration of fluid in the substance of the mucous membrane, which may be very red and tender, the conditions may be quickly cured by painting over the part three or four times a day with spirits of wine, *Spiritus Vini Rectificatus*, or some other form of alcohol, or with spirits of camphor, *Spiritus Camphoræ*.

Solution of Nitrate of Silver.—Many lotions composed of

metallic salts are employed in the treatment of sores. Most of them act by virtue of their property of coagulating and precipitating and forming compounds with albuminous matters. Among these salts is nitrate of silver, which causes the sores to heal very quickly. With a small camel-hair brush you paint the fissure with a little solution of nitrate of silver, consisting of from five to ten grains of the nitrate in an ounce of distilled water. This is to be applied to the fissure, and will give pain for the moment, but the soreness soon passes off. The growth and multiplication of the masses of bioplasm are prevented. Time is allowed for the young cells of cuticle to harden. Gradually, new skin is formed, the growth of healthy epithelium is favored, and before long the healing process is completed.

Conjunctiva.—We will now consider the changes affecting another part of the mucous membrane—that which covers the front of the eye and lines the eyelids—the *Conjunctiva.* This moist mucous membrane is very highly sensitive, and as we all have experienced, readily passes into a state of inflammation.

Many probably have suffered more or less from slight inflammation of the conjunctiva. If you go out in foggy weather, and afterwards examine the conjunctiva, you will often find many of its vessels distended, and you will observe that it is much redder than it was before you exposed it to the deleterious effects of the irritating substances which are suspended in the air in a fog. The change in question is a reflex action due to change in the nerve-centres induced by the effect of the poisonous matter on the peripheral ramifications of the sensitive afferent nerves, and a consequent paralyzing reflex action upon the nerves of the little arteries. In the case of persons who are in a low state of health who have lived badly for some time, and especially in those who belong to scrofulous families, there is increased

liability to inflammation of the conjunctiva and the glands and other structures which are connected with it. The little glands beneath the conjunctiva are often enlarged, and sometimes to a considerable extent. When the mucous membrane is inflamed these little glands participate, and from them is poured out an abundant secretion containing numerous particles of bioplasm. The vessels are distended, and that part of the mucous membrane which lines the eyelids and covers the white part (sclerotic) of the eye is reddened and in a state which well illustrates the changes taking place in inflammation. The condition is called *Ophthalmia* or *Conjunctivitis*, and is of great interest scientifically, because a transition from the normal or ordinary state of health to the abnormal and usually temporary state of inflammation may be studied in its gradations. It is easy to examine the membrane from time to time with a lens, and without causing pain or inconvenience to the patient.

The conjunctiva, especially in ill-fed, ill-nourished scrofulous children, not only readily takes upon itself this exaggerated action, but passes into a state of inflammation which, though slight for a time, may soon become very severe, with an abundant formation of a yellowish secretion. If a little of the discharge is examined in the microscope, it will be found to consist of multitudes of particles of living matter, well known as *pus-corpuscles*. Such is the virulence of these living particles that if no more of the discharge than can be carried on the point of a needle, be transferred to the surface of the eye of another person which may not perhaps be perfectly healthy at the time, a similar pathological state is quickly established. Serious inflammation is excited, and the same series of phenomena recur. From this case the poison may be transferred to a third, and so on.

Now, if many children in weak health who for some time

previously have been badly managed as regards food, air, exercise, and cleanliness, are allowed to congregate, and especially if they are confined in close, ill-ventilated rooms, the disease may not only arise but soon acquire an extraordinary degree of virulence. It may spread so quickly in such a community of children, that in a short time out of four or five hundred, one-third or even a larger proportion may be suffering from the disease. Of the number affected many will suffer very severely, and serious structural changes will result. The transparent part of the eye in front, known as the cornea, may ulcerate, and when after some time it heals, will be so altered that the transparent tissue will become opaque, or the eye itself may be destroyed, blindness of course resulting in both cases.

This very virulent poison of purulent ophthalmia may, as I have remarked, be evolved in the first instance without contagion. The contagious material may originate,—just as a highly contagious poison may be developed in the organism of a person suffering from peritonitis and some other inflammatory and febrile diseases. The contagious matter once developed, however, may spread far and wide with a rapidity which is quite remarkable. You see, therefore, that you may develop an animal poison of a most contagious form, the most minute portion of which, not more than would remain on the point of the finest needle, would establish the same series of pathological phenomena in a comparatively healthy conjunctiva if transferred to it. Probably many of the pus-corpuscles found on the surface of the conjunctiva do not result from the particle inoculated. Some, no doubt, are formed from the young cells of conjunctival epithelium. There are two kinds of bioplasm growing and multiplying at the same time, but so intermingled that it would not be possible to obtain particles of each kind separately.

Treatment.—Inflammation of the conjunctiva should be carefully treated. It is undesirable to allow this inflammation to go on, especially in children, because it may reach a stage in which there is danger of damage, not only to that very important structure of the eye, the cornea, the clearness of which is essential to distinct vision, but to the whole organ.

Good hygienic conditions are essential in the treatment of the disease as it occurs in children; and it is very important to look for and relieve that preliminary state of inflammation and enlargement of the glands in the membrane, which almost invariably precedes an attack of purulent ophthalmia.

Medical Treatment, Astringent Applications.—Many astringent substances are of use in the treatment of inflammation of the conjunctiva. These may be applied in various ways. In former days it was the practice to project a small quantity of some astringent powder on the surface of the inflamed conjunctiva, by placing a little of the powder in a quill or piece of straw, and blowing it suddenly upon the eye, which was kept open for the moment. These powders were usually made of sugar and the potent substance in the proportion of from ten parts or more of the former to one part of the latter, the whole being very carefully mixed and very finely powdered. *Oxide of Zinc, Nitrate of Potash, Alum, Sulphate of Copper, Nitrate of Silver,* and other substances have been used in this way; but the practice is a bad one, and has been almost entirely abandoned in favor of solutions, which may be applied as drops, or by using an eye-glass or an eye-fountain. Strong astringent applications should never be used except under proper advice. A solution containing ten grains of nitrate of silver, or even more has been employed; but unless such potent application be used with the utmost care, and in certain very exceptional

cases only, serious damage to the eye instead of relief may result.

Of Lotions and Eye Waters.—One of the best is a weak solution of Sulphate of Zinc, *Zinci Sulphas*, in water; or, if you wish to order a more elegant lotion, in Rose Water, *Aqua Rosæ*. As regards the quantity, you may order from a quarter of a grain to a grain to the ounce of water. A very dilute solution will often produce a favorable change in cases of mild inflammation of the conjunctiva in a few hours. *Sugar of Lead, Plumbi Acetas, or Sulphate of Copper, Cupri Sulphas*, may be used in the same proportion as Sulphate of Zinc; but the latter and *Nitrate of Silver, Argenti Nitras*, are probably the most useful. Of the last, the proportion should be half a grain or less to an ounce of distilled water. If the eye is very painful, a grain of Opium or two or three drops of Laudanum, *Tinctura Opii*, to the ounce of water may be prescribed. In all cases the solution should be carefully filtered before it is applied. A lotion consisting of *Spirits of Wine, Spiritus Vini Rectificatus*, or good brandy, *Spiritus Vini Gallici*, in the proportion of one part to thirty or more parts of water, has also been recommended; and where the vessels are dilated without any production of pus, the careful application of a weak spirit solution may be very useful.

Lotions may be applied to the surface of the eye in two or three different ways. One of the best methods is to seat the patient in a chair, and make him throw his head back. You then take a good-sized camel-hair brush, which will take up one or two drops of the lotion, which are to be allowed to fall into the inner corner of the affected eye. Of course, the patient will instinctively close the eye, but he must be encouraged to open the lids a little, so that some of the solution may pass in, and the surface of the conjunctiva be thoroughly moistened with it in every part.

Another plan is to bathe the eye with an ordinary sponge or rag, but you must always be most careful that the particular sponge or rag is used for no other purpose whatever, and that where there are several patients each shall have his own sponge, towel, etc., kept exclusively for his own use.

Another way of applying lotions to the conjunctiva is with the aid of an *Eye-glass*. This is a little glass made something like a small wineglass, but the free edge is so shaped as to fit the margin of the orbit. The eye-glass is half filled with the lotion, and the patient is directed to hold the glass steadily against the eye, and then the head is to be moved about in such a way as to cause the fluid to splash against the surface of the conjunctiva. The glass acts so as to keep the lids open, and in this way you insure the lotion coming in contact with the surface of the mucous membrane.

Lastly, there is the little *Eye-douche* or *Fountain*, by the aid of which a jet of lotion can be thrown against the eye. All these instruments may be obtained of surgical instrument makers.

Astringent lotions generally by their indirect action upon the nerves of the part, and by their direct action upon the particles of bioplasm which are growing, favor the formation and condensation of the firm material upon which the consistence and the protective character of the epithelium depends; and thus a "raw" or nearly raw surface becomes again protected with a layer of ordinary slow-growing epithelial tissue.

Sore Throat.—In an early lecture I have adverted to the changes which occur in sore throat, but in this place I shall consider some questions in connection with the subject which were then passed by. Most of us have suffered more or less from sore throat. In the case of those who are susceptible, there frequently occurs a certain amount of con-

gestion and inflammation in the mucous membrane of the fauces, and of the back of the pharynx. If you look at the palate in such a case, you will find it in very much the same condition as I described when speaking of the mucous membrane of the nose in an ordinary cold. Many of you will have opportunities of making the observation in your own persons. You may easily examine your own fauces with the aid of an ordinary looking-glass. Instead of the membrane appearing moist, you will find that it is nearly dry, and perhaps you may see a piece of half-dry viscid mucus intimately adhering to it. The sensibility of the membrane is affected. Although it feels sore, you will find that it is less sensitive than in the normal state, while certain of its nerves do not act so readily as they do in health.

If the throat is perfectly healthy, the process of swallowing or deglutition is easily performed, and almost unconsciously—at least without any great effort; but if the throat is sore deglutition becomes difficult, and you have to make a very decided effort, perhaps more than one, before the morsel of food is successfully swallowed.

Then there is another fact of some importance with regard to the action of the mucous membrane. Not only are the nerves which are connected with the capillary vessels, and which are concerned in the sensation of pain and discomfort, obviously affected, but those which are instrumental in exciting by reflex action the contraction of the pharyngeal muscles. If, in the normal state of health, you tickle the soft palate ever so slightly with a feather, if the mucous membrane enjoys its proper sensitiveness, movements of deglutition almost instantly succeed. But if the throat is "sore," the mucous membrane red, and perhaps dry, you may tickle it very decidedly, and only feeble contraction will follow after an interval of time, or no contraction of the muscles will occur. In this action the muscular fibres

fail to contract, because the nerve-fibres which carry impressions from the surface of the mucous membrane to the nerve-centre are deranged. Their action for the time being is prevented. There is, as it were, a peripheral paralysis. The motor nerve-fibres, the nerve-centre, and even the afferent trunks themselves, may be all right; but the fine ramifications of the afferent fibres in the mucous membrane are so affected by the effusion in its substance and other changes, that they do not receive and transmit impressions.

When sore throat attacks persons who have for some time been in a low state of health, or exposed to adverse influences, as sometimes happens in the case of those resident in workhouses, hospitals, jails, and other places, it may run on very quickly to extensive superficial ulceration, which may affect the substance of the tonsils, and progress for several days. The fetid products resulting from the decomposition of the secretion taking place upon or near the ulcerated surface are sometimes absorbed into the blood and produce a form of blood poisoning. If swallowed they occasion much disturbance of digestion. It is, therefore, most important in the treatment of such cases to apply substances to the surface which have the effect of completely changing the organic matters and destroying the infecting material.

If diphtheria exists in the neighborhood, persons in a low state of health, and those already suffering from sore throat, are very likely to take the disease, which sometimes runs its course so very quickly that life is in jeopardy in a few hours after the malady has declared itself, or even before there has been time for the formation of a false membrane, or for the development of any characteristic phenomena of the disease. It is, therefore, of the utmost importance to very carefully watch cases of sore throat, especially when of an epidemic character. You should see the patient frequently, and you should give quinine and stimulants early, instead

of waiting until the patient is very low. You will be surprised to find that persons may take in twenty-four hours from ten to thirty grains of quinine and eight or ten ounces of brandy divided into doses given every two hours, without any indication of the quantity of either remedy being excessive; and it may be necessary to continue this treatment for many days, giving at the same time plenty of beef tea or milk.

The Treatment of Sore Throat.—We are often consulted by patients who complain that they are almost constantly suffering from soreness of the throat. It is sometimes better, sometimes worse, but they will tell you the throat always feels rough and uncomfortable. Many local applications are of great use. You may paint the fauces with a solution of Nitrate of Silver, *Argenti Nitras*, but a stronger solution may be employed than was recommended for applying to the conjunctiva. A solution consisting of from five to ten grains to the ounce of distilled water answers well, or you may employ a mixture of solution of Perchloride of Iron, *Liquor Ferri Perchloridi*, and an equal quantity of glycerin, *Glycerinum;* this is a very valuable remedy in the treatment of sore throat, whether it be mild or severe. The glycerin causes the Perchloride of Iron to adhere to the surface for a little time, and in that way increases its beneficial effects. In forms of sore throat, in which there is a quantity of viscid mucus, accompanied with excoriations, or ulcers on the palate or tonsils, the mixture may be applied every two hours, or oftener. The solution is a potent antiseptic, and destroys any deleterious properties the secretion may possess. From its application efforts of vomiting are often excited, and thus much of the secretion is got rid of. I have successfully treated in this way many bad forms of sore throat, which by some would be called "*diphtheritic*." The condition is associated with great depression of strength

and as I have before said it is necessary to give quinine and wine or brandy in very decided doses. Any of the foul secretion swallowed by accident is rendered innocuous by the action of the iron. In this way stomach disturbance, so apt to ensue in these cases, and which so much increases the risk of life when it does occur, may be prevented. Tannin dissolved in glycerin, *Glycerinum Acidi Tannici*, is also a good application. In applying such local remedies, whether a solution of Nitrate of Silver, or Glycerin and Perchloride of Iron, or the Tannin, perhaps the best plan is to take a good large camel's-hair brush, which must be carefully tied to the end of a stick. This latter point is important, because if the brush is simply placed on the stick, it may unfortunately fall off at a critical moment, and be swallowed by the patient. The possibility of the occurrence of so awkward an accident may be prevented. The brush is to be thoroughly wetted with the application, and a few drops being taken up in it, the wet brush is to be well smeared over the surface of the affected mucous membrane. After a quarter of a minute the patient may be allowed to gargle with a little cold water.

Gargles.—Various gargles are used in the treatment of sore throat, and an inflamed or aphthous (p. 333) state of the mucous membrane of the mouth. The influence of some of these is due to the presence of matter having astringent properties, while others depend for their efficacy upon some form of alcohol.

Port wine is an excellent gargle in cases of ordinary relaxed sore throat, but some people do not like port, or any other kind of wine, and in that case you may order a gargle consisting of one part of spirits of wine to four or five parts of water.

Alum used to be a favorite remedy, dissolved in a little water in the proportion of one drachm to six ounces.

A good gargle may be made by dissolving a drachm of Nitrate of Potash, *Potassæ Nitras*, or Chlorate of Potash, *Potassæ Chloras*, in six or eight ounces of water. An ounce of glycerin or honey may be added. Some like gargles made acid; for this purpose you may order a drachm of Dilute Acetic, Phosphoric, or Hydrochloric acid, to six or eight ounces.

Many persons derive benefit from the use of a stimulating gargle, which may be made by adding a little Cayenne pepper, or Tincture of Capsicum, *Tinctura Capsici*, in the proportion of one drachm or less to six ounces of gargle, but this is not suitable in the case of a very sensitive irritable mucous membrane, and may do harm instead of good.

Common salt is valuable as a gargle. A weak brine may be made by adding a dessertspoonful of salt or less to half a pint of water. The throat may be gargled with this solution once in two or three hours. In ordering gargles it is necessary to give the patient exact directions, to tell him to use them frequently, for it is useless to gargle once or twice in the four and twenty hours. If the sore throat is at all severe, the gargle should be used once or twice in the hour.

Of Exciting Increased Action in Distant Parts.—You may sometimes relieve a sore throat as well as other forms of local inflammation and congestion, by causing increased action in other organs and tissues. The action of a purgative is often followed by the relief of the throat affection. Diuretics and sudorifics may be prescribed with the same object; counter-irritation may be applied in some other part of the body. A mustard poultice to the neck, by establishing increased action on the cutaneous surface, often reduces the congestion of the mucous membrane of the throat. When slight, and not depending upon a general low state of the system, or altered blood, a sore throat may sometimes be cured in this way in a couple of hours.

Inflammation of the Mucous Membrane of the Air-Passages.—When the mucous membrane of the large bronchial tubes is inflamed, we have an ordinary catarrh, the phenomena of which have been already referred to. I mentioned there was congestion of the fauces, increased formation of mucus, and increased action of the glands. The transition from the ordinary epithelial cell to the viscid material, known as mucus, and from the mucus-corpuscle to the pus-corpuscle, may be observed and studied. In cases in which the inflammation continues for a considerable time, instead of viscid transparent mucus being formed, we meet with ordinary pus, or pus mixed with mucus, which is known as *Muco-pus*, the microscopical characters of which must be carefully studied as opportunity offers, as well as those of other forms of sputum formed in different cases of disease.

What is termed false membrane, or croupous membrane, is frequently formed in cases of inflammation of the mucous membrane of the larynx, trachea, and bronchial tubes. I have seen cases in which a complete and firm membranous-looking cast of these passages was formed on the surface of the mucous membrane, and expelled with some difficulty. The firm material consisted entirely of viscid mucus. Casts of the smaller bronchial tubes are also sometimes formed of mucus, but more commonly they will be found to consist of fibrinous material which has been poured out from the blood, and has coagulated in the air-tubes.

Inflammation of the Mucous Membrane of the Stomach and Intestinal Canal.—The mucous membrane of the stomach is very liable to congestion and inflammation, much more so, I think, than is generally supposed. From time to time these pathological changes probably affect small patches of mucous membrane, lasting for a time, and then passing off if the mucous membrane is

soothed and allowed to rest from active work for a few days.

In all our best works on medicine, the subject of ulcer of the stomach is fully treated of, but there is a state of things allied to ulcer, and leading to it, to which reference is seldom made. The state of mucous membrane to which I allude is not so serious as ulcer, but it is much more common, and if not relieved, may be succeeded by the formation of an ulcer. The mucous membrane of the stomach, like the nasal and bronchial mucous membrane, "takes cold." It becomes red and less moist than in the normal state. There is often great discomfort, and very frequently severe pain. The glands are more or less affected, and the functions of the stomach are very seriously disturbed. The secretion of gastric juice is interfered with, and its qualities changed. Digestion is of course deranged, and sometimes completely checked. There may be much flatulence, which adds to the distress. Many patients, instead of allowing the stomach to rest for awhile, are too prone to call for food, when they experience any uneasiness. They feel exhausted, and think a good meat meal will certainly relieve their discomfort. This they take, and very soon find their mistake, for the pain is increased. If they are fortunate, vomiting will be excited, and all that has been taken, with perhaps other matters already in the stomach, will be rejected, when considerable relief will be obtained. I believe in a number,—perhaps in the greater number of these cases there is really no ulcer, but a condition of mucous membrane which is the state preliminary to ulceration. When you have reason to think that a patient is suffering from this slight inflammation, it is desirable to at once carry out measures for relief, and effect a return to the healthy state as soon as possible, for the stomach is an organ which we cannot relieve from work for long at a time without the

whole body suffering. You order nothing but unirritating, soft, or liquid food for awhile, and then take care that for the next few weeks only food of a soothing character, and which will be very easily digested, passes into the stomach. The patient must on no account be allowed to take ordinary diet, and you must tell him not to touch beer, and enjoin him not to take very cold or very hot liquids of any kind. Every form of alcohol should, as a general rule, be withheld, because in a great many instances alcohol only irritates, and sometimes increases the pain. It may do much harm, though it must be admitted that not unfrequently it relieves for the moment the discomfort and sinking feeling which sometimes distress the patient. For this reason it is imperative to be most cautious in such cases. We ought never to give people any excuse for permanently damaging their tissues, by acquiring the habit of taking too much alcohol.

Meat often disturbs the highly sensitive gastric surface. Meat, for its digestion, depends entirely upon the secretions of the stomach glands, and as this secretion is temporarily deranged, it is better to allow the mucous membrane to do as little work as possible, and to withhold meat or fish for a time. We usually put the patients on a milk diet. You may order them to take bread and milk, or arrowroot and milk, or rice, sago, tapioca, macaroni, vermicelli, and cooked in such a manner as to make a very soft moist application. By adopting this advice, the patient applies something like a poultice to the disturbed mucous membrane of his stomach, and in many other cases, with great and immediate benefit. It does no one any harm to live on soft food of a farinaceous kind for a few days or a week. Indeed, not a few would gain in health if they systematically adopted such a diet for a week or two once in every two or three months. A very good substance to recommend pa-

tients under these circumstances, only you will find many will refuse to eat it, is lentil flour, well boiled and made thick like gruel. *See* p. 98.

Any part of the mucous membrane of the small or large intestine may be affected by congestion and catarrhal inflammation. There are many cases in which there is severe pain "in the stomach," as the patient says, but which depend upon derangement of some part of the small or large intestine. The mucous membrane may be congested in patches, and the action of the follicles and of the villi for a time becomes seriously disturbed. By taking care that only bland substances, and as little as possible of these, pass along the small intestine for a time, the mucous membrane is soon restored to its normal state. It is important to check such disturbances as soon as possible. Though according to the patient himself, he may be suffering only from "pain in the stomach," if he do not take complete rest, what is only a slight ailment may soon become a grave malady. In such cases, diet is of more consequence than medicine, but if the pain is very severe, it may be necessary to give small doses of sedative medicines. Advantage also results from employing mild counter-irritants over the belly. The best counter-irritant is a poultice made of half mustard and half linseed-meal. This may be applied to the surface, near the seat of pain, and it unquestionably relieves the inflammation.

The external application of warmth greatly relieves pain which results from a congested or inflamed state of the mucous membrane of the intestinal canal. The application of a linseed poultice, or flannels wrung out in hot water, will be of service. If, however, this does not soon afford relief, the surface of the poultice or the flannel may be sprinkled with turpentine. The thick india-rubber bottle for hot water should find a place in every traveller's trunk. It is

most useful in the treatment of abdominal and other pain. I have already referred to it in p. 180.

Stimulating liniments are, as a general rule, not advisable. You do not want to move the bowels about in the least degree, or to disturb the parts at all. If you allow people to rub things in, the chances are they add to the sufferings of the patient, and do harm to tissues already tender and irritable, and in a state verging upon actual disease.

Congestion and inflammation of a portion of the mucous membrane of the large bowel is not uncommon. There is in such cases severe pain, and the action of the bowel is much deranged. The condition may pass on to ulceration, which may endanger life. Ulcers frequently form in the lower part of the small intestines in cases of typhoid fever, the healing of which is always a very slow process. Every case of typhoid fever requires very careful management, not only at the time ulcers are forming and the sloughs separating, but during the healing process. Three months sometimes pass before you can allow a patient suffering from typhoid to resume his usual diet and habits of life. All attempts to hasten convalescence are unwise, and every now and then a patient is lost in consequence. Full time must always be allowed for the healing of ulcers in any part of the alimentary canal.

There happens to be just now a case of mild dysentery under my care in the Hospital. The man suffers much pain, and from the usual symptoms. He passes liquid motions with a good deal of mucus. In this case we are adopting, with the greatest benefit, a mode of treatment which may be considered "empirical" (*εμπειρια*, experience); although the remedy employed is undoubtedly useful, we do not know precisely how it acts. Ipecacuanha powder is of the greatest use in many such cases—not only where there is actual ulceration of the mucous membrane of the

colon, but where there is an approach or tendency to this condition. In India this drug is much used in the treatment of dysenteric affections. You may begin with doses of two or three grains of Ipecacuanha, in the form of a powder or pill, and you may increase the dose up to twenty grains or more, twice or three times a day. The medicine may be continued until the symptoms are greatly relieved. In many cases the patient is completely cured in a month or six weeks. The reason why the dose must be only gradually increased is, that with many persons even five or ten grains will act as a very decided emetic. If you desire to study the mode of action of an emetic in your own organism, there will be no harm in trying the experiment. You may take twenty grains of Ipecacuanha powder, *Pulvis Ipecacuanhæ* (not *Pulvis Ipecacuanhæ Compositus*), suspended in half a tumbler of warm or lukewarm water. The dose may be followed by one or two tumblers of warm water, and in the course of ten minutes or a quarter of an hour you will have an opportunity of studying the violent contraction of the muscular coat of the stomach excited by reflex action consequent upon the irritating effect of the Ipecacuanha upon the afferent nerve-fibres of the mucous membrane of the stomach. Ipecacuanha is one of the most potent, and in action one of the least disagreeable, of emetic remedies. If, however, you begin by giving small doses of the emetic, the patient becomes tolerant of its action, and vomiting will not be excited. You may gradually increase the dose until the patient will bear doses which are ordinarily emetic—twenty grains or more three times a day—without any inconvenience, and without experiencing even the slightest nausea.

Congestion and inflammation occur in connection with other mucous membranes, as well as those to which I have specially drawn your attention. Thus, the gall-bladder and

gall-ducts may suffer congestion, and inflammation of the mucous membrane of the urinary bladder, of the ureters, and of the pelvis of the kidney are unfortunately frequently met with, but these cannot, I regret to say, be classed among slight ailments, and they will come under our consideration in another part of the course.

It has been remarked several times, in these introductory lectures on slight ailments, that illnesses which apparently come on suddenly are themselves but the consequence of prior changes which have been going on for some time previous to the attack. These preliminary changes are a necessary and essential part of the illness, and, but for them, the attack could not have occurred. The invasion seems to be sudden, but the passage from comparative health to decided illness is deceptive, for derangement has existed for some time, though the patient may not have been aware of it.

By paying attention to the signs and symptoms of derangements which are correctly called slight, and relieving them as soon as possible, we may succeed in preventing the occurrence of grave pathological changes. You will observe that many persons who will tell you they do not know what it is to feel well, have not in the whole course of their lives once been seriously ill, and such lives you will often find to be exceptionally long. The man who experiences slight disturbance of health oftentimes takes steps to relieve his discomfort, and, by acting thus, very likely at once removes the condition preliminary to the development of disease. It is also probable that the means taken to remove slight symptoms are also effective in bringing about a state of the system which is not favorable to invasion by severe illness. It would seem as if some preparatory changes were necessary to render the organism fitted either for the reception of morbid poisons, or for the initiation of the majority of

morbid changes in tissues and organs. Even in the case of many purely local lesions it is probable that, for some considerable time before any actual structural change has occurred, there have been congestion and disturbed action. But for the persistence of this, the local disease would not have manifested itself. How important it is, therefore, to search for evidence of preliminary change, so that, by altering the conditions of life for a time, by relieving local congestion, by promoting excretion, or by establishing some increased local action, you may succeed in bringing about a return to physiological health before any of those conditions, which will occupy much of our attention in this course of lectures on the Principles and Practice of Medicine, are developed.

I have already drawn your attention to the preliminary changes which occur in the conjunctiva and glands connected with it, by which it becomes fitted for the reception and propagation of the minute particle of that specific and poisonous bioplasm which is concerned in the development of a most formidable and destructive kind of inflammation. Although there are, undoubtedly, a few living poisons which are so virulent in their properties, and have such extraordinary power of vitality that almost every one exposed to their influence is attacked, this is so decidedly exceptional that one may fairly venture to put forward the conclusion that it is at least conceivable that a human or animal organism may exist, against which the great majority of contagious poisons known to invade might beat in vain. And, as time goes on, I think I shall convince you that the prospect of our being successful in discovering the means of enabling the individual organism to resist the assaults of contagion is far brighter than that of our discovering how to exterminate contagion itself, and to prevent new forms of contagious living matter from springing into life.

The poison instrumental in carrying ophthalmia undoubtedly spares some exposed to its influence, and, amongst those attacked, may be noticed varying degrees of severity. Even ringworm, and many other diseases invariably associated with the growth and multiplication of a special vegetable organism, will not invade every individual indiscriminately, and those who have been long under bad influence, as regards bodily health, are sure to be the first attacked, and to suffer most severely and for the longest time, from the disease. Of a number of persons swallowing the poison of Typhoid, or exposed for the same period of time to its baneful influence, some will escape altogether, some will be violently assaulted by the poison, but will escape without the specific disease being developed, in consequence of a sharp attack of diarrhœa; some will pass through a mild form of the disease, and a small number will be severely attacked, of which perhaps one-eighth will be destroyed, by the fever or its consequences.

So, too, with regard to acute inflammations and various diseases of a non-contagious character. An attack of acute rheumatism is always referred to exposure to wet and cold, or to sleeping in a damp bed, or to a long drive or walk in the rain, or to some single unfortunate circumstance or want of caution. But how many are exposed, over and over again, to adverse conditions of precisely the same character, with perfect impunity. The state of the blood which precedes the attack, and which alone renders the attack possible, has been arrived at after a prolonged course of changes. But if this special state of blood exists not, instead of the person exposed to the adverse influences being attacked by acute rheumatism or pneumonia, or pleurisy, or some other acute inflammation, he experiences, perhaps, a sharp rigor, accompanied possibly by local pain and general discomfort,

succeeded in two or three hours by profuse sweating, perhaps diarrhœa and the secretion of urine rich in urates, uric acid, and other matters; and, in the course of a day or two, with the exception of feeling a little weak, the normal state of health returns. Perhaps for some time afterwards he may even feel exceptionally well and vigorous. The patient has, in fact, been relieved by the removal of various substances which had been for some time accumulating in his blood, to his detriment, and which, at any moment, might have been intimately concerned in the development of local disease in some important organ. These considerations, and many more to which I might advert, point to the general conclusion that the maintenance of each individual organism in a good state of health, and careful attention on the part of the practitioner to slight ailments, and to any symptoms that may indicate derangement of function or action, is of far greater importance, practically, than the hunting and extermination of various species of hypothetical pathological bacteria, even though it were actually possible to catch and exterminate legions.

If only the organism be in a proper state, almost all disease germs coming in contact with it, or entering it, will certainly die, instead of growing and multiplying and destroying the body. These poisons are around about us—in the food we eat—in the water we drink. The foot of a fly will carry enough of the poisonous matter to infect a household. It is, therefore, vain to be always seeking to annihilate contagion, which you can only destroy to a most limited extent. On the other hand, it seems exceedingly reasonable, and especially for nurses and for ourselves, who must be continually exposed to the assaults of disease germs, to do all that is possible to promote and improve the resisting power of the body. We always notice that, of those exposed to the same adverse conditions, a very small percentage only

will be seriously ill. A moderate number will catch cold or experience some slight derangement, while the majority will entirely escape. No doubt such facts may, in part, be explained by the supposition of difference in constitution of the different individuals. But allowing for this, there is ample ground for concluding that it is possible to preserve the body in such a state of health that it would resist many attacks of illness to which, in a different condition, it would certainly succumb. In other words, there is good reason for the conclusion that it is possible to increase the sum total of the health of the community. By detecting and treating slight derangements, I have no doubt whatever that we do very frequently succeed in preventing serious disorder.

The comparative immunity of those who are frequently troubled with various slight derangements of health is, perhaps, to be explained by a highly sensitive and active state of those nerve-fibres and that part of the nervous system which is intimately connected with the action of the circulating and digestive systems. In some persons these nerves respond to the slightest stimulus, and the least departure from the ordinary state is at once productive of inconvenience or discomfort; while in others, considerable variation, as regards temperature, quality and quantity of food, make little or no impression, and occasion no immediate disturbance or derangement. But, in the latter case, pathological changes may take place and result in grave structural alteration, without the patient having experienced the least discomfort, or being made aware that any departure from health had occurred before the occurrence of the serious illness which you are asked to investigate and treat. Perhaps, in some such manner, we may explain the fact that certain individuals are suddenly struck down by terrible disease though they seem to be in good health, while others, who

are never well, never feel well, or look well, reach old age without experiencing one single attack of any serious illness. Such persons are often forced to be careful, as regards diet, and the feeling of tiredness after great exertion is in them so strong that it must be yielded to, and thus they are forced to take rest before any harm whatever is done to their organs. Who knows whether careful attention to the processes of excretion, as well as to the quality and quantity of what is taken does not bring about a state of blood in which fever germs instead of growing and multiplying, would die? How many ailments may be prevented by living for a day or two now and then on low diet? How thoroughly may not the blood be depurated by a sharp purge given, perhaps, just before *liquor sanguinis* was about to escape from the vessels to be poured into the air-cells of the lung? Might not the purgative be fairly considered to have prevented an impending attack of acute pneumonia or inflammation of the lung, or to have really "cut short" the disease?

Moderate doses of Bicarbonate of Potash or Soda, taken in solution twice or three times a day for a week or two, may avert an attack of acute rheumatism. A small dose of certain preparations of Mercury now and then may prevent attacks of gout or rheumatism or sick headache or dyspepsia or biliousness. Salines, by their action on the bowels and kidneys, may by promoting free elimination, establish a state of the system which may be incompatible with many morbid changes of serious consequence.

I have endeavored, in these few lectures, to indicate reasons why we should not fail to devote some attention to the study of those slight departures from the normal state which possibly, in these days, are too frequently passed over by the practitioner as unimportant, and the import of which may be either strangely exaggerated or hardly noticed by the patient himself. As I have tried to impress upon you

many times, slight derangements often afford the first indications of commencing disease of a serious character. By judicious management, not only may some troublesome though slight ailments be entirely removed, but further and progressive morbid change may be prevented or retarded.

The principles upon which the treatment of many slight ailments may be successfully conducted are the same as those upon which the management of more marked developments of morbid phenomena is based. In the first lectures, I have given illustrations of the simplest and slightest ailments, and have endeavored to show how their treatment may be most simply and successfully conducted, and I have attempted to lead you on by degrees to consider more highly complex pathological changes, and to explain the principles upon which more elaborate methods of treatment are based. In no way can you so quickly acquire that sound knowledge of pathological processes, and of the means of checking or modifying them, as by adopting the course I have advocated. Let me, therefore, conclude by impressing upon you the importance of not neglecting the study of the nature and treatment of slight ailments now or at any period of your professional career.

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